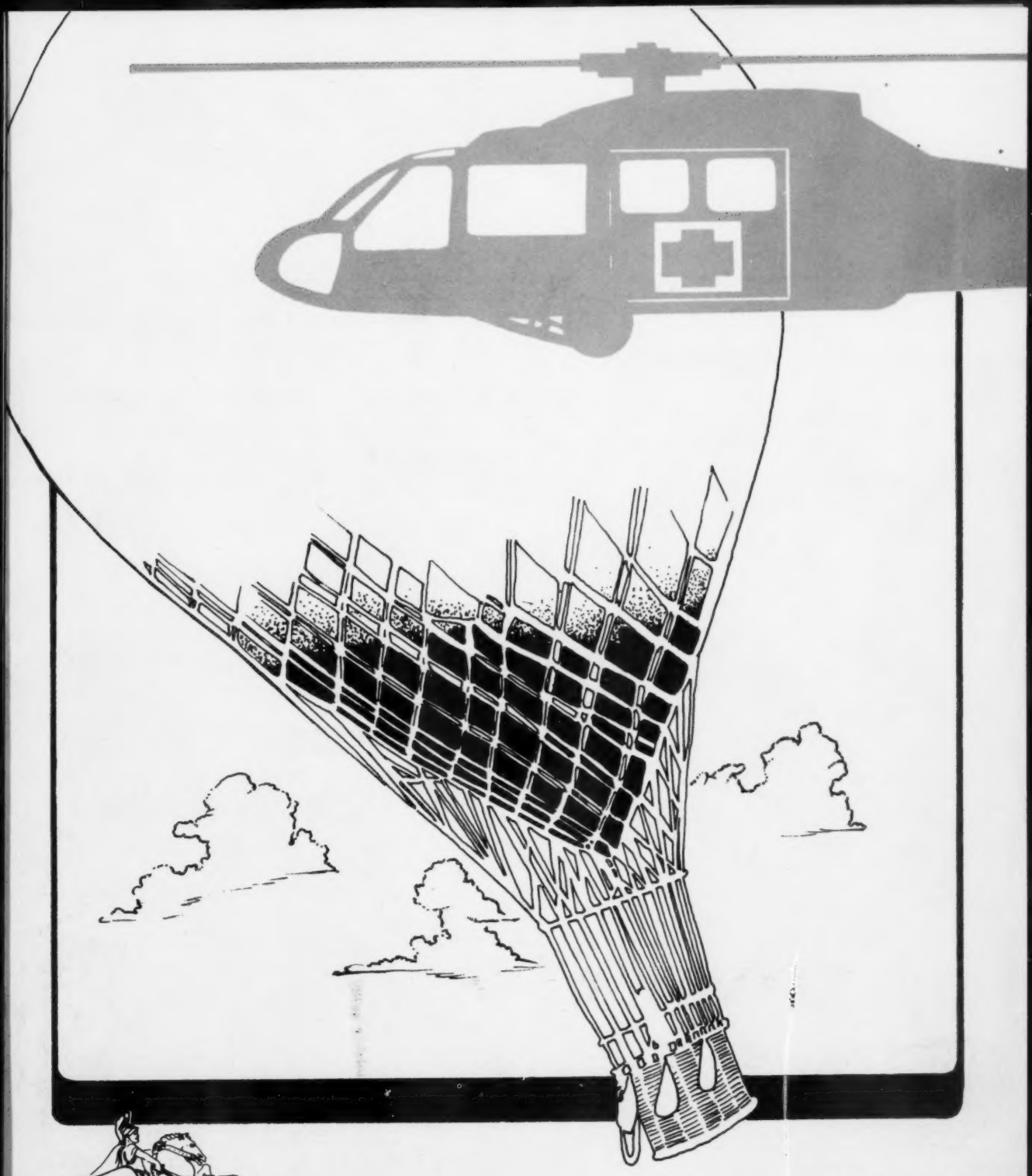


UNITED STATES ARMY

OCTOBER 1976

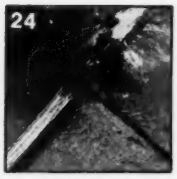
AVIATION DIGEST

UNITED STATES ARMY AVIATION DIGEST

OCTOBER 1976 VOLUME 22 NUMBER 10

A Doctor Looks At Army Aviation, MG Spurgeon Neel, M.D. 1
Helicopter Aviation Medicine, COL Raphael J. DiNapoli, M.D. 2
The Flight Surgeon, COL Daniel T. Sanders, M.D. 3
U.S. Army Aeromedical Research Laboratory, COL Robert W. Bailey 4
Winning The War On Weight, Dennis R. Brightwell, M.D. 6

The MAST Program 8
Aeromedical Transportation For Infants And Children, Burton H. Harris, M.D.; LTC Robert E. Orr; E. Thomas Boles Jr., M.D. 12
New OH-58 Engine, Merle A. Clapsaddle 15
Aviation As A Specialty, LTC B.H. Freeman 16



ATC Action Line 19
Carson Aviators Play Major Role In "Thompson" Rescues, MSG Floyd O'Neal 24
The Professional In The Simulator 29
The 5C Recipe For Inadvertent Soup, CPT Michael E. Herndon and CPT Kent N. Graham 30

The Positive Side, Ted Kontos 32
More Than A Doctor, LTC David H. Karney, M.D. 36
Your Unit?, Arnold R. Lambert 40
Pearl 42
Ditching The Huey, CW4 John L. Nicol 44
Pipeline 48

VANGUARD OF FREEDOM
BICENTENNIAL 1775-1975
UNITED STATES ARMY

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ABOUT THE COVER

The balloon and helicopter on the cover set the theme for this month's issue: Army Aviation Medicine. The *DIGEST* thanks Mr. Robert Rankin, Medical Illustrator, Veterans Administration Hospital, Lexington KY, for preparing the cover artwork

The mission of the *U.S. ARMY AVIATION DIGEST* is to provide information of an operational or functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, aviation medicine and other related data.

The *DIGEST* is an official Department of the Army periodical published monthly under the supervision of the Commanding General, U.S. Army Aviation Center. Views expressed herein are not necessarily those of the Department of the Army nor the U.S. Army Aviation Center. Photos are U.S. Army unless otherwise specified. Material may be reprinted provided credit is given to the *DIGEST* and to the author, unless otherwise indicated.

Articles, photos, and items of interest on Army aviation are invited. Direct communication is authorized to: Editor, U.S. Army Aviation Digest, Fort Rucker, AL 36362.

This publication has been approved by The Adjutant General, Headquarters, Department of the Army, 23 December 1975, in accordance with AR 310-1.

Active Army units receive distribution under the pinpoint distribution system as outlined in AR 310-1. Complete DA Form 12-5 and send directly to CDR, AG Publications Center, 2800 Eastern Boulevard, Baltimore, MD 21220. For any change in distribution requirements, initiate a revised DA Form 12-5.

National Guard and Army Reserve units under pinpoint distribution also should submit DA Form 12-5. Other National Guard units should submit requests through their state adjutant general.

Those not eligible for official distribution or who desire personal copies of the *DIGEST* can order the magazine from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Annual subscription rates are $15.70 domestic and $19.65 overseas.

A Doctor Looks At Army Aviation

Spurgeon Neel, M.D.
Major General, MC
Commander
U.S. Army Health Services Command
Fort Sam Houston, TX

MEDICINE AND aeronautics have enjoyed a rich heritage of togetherness through the years. Physicians played prominent roles in pioneering balloon flights in the late 18th century. Dr. Albert J. Myer established the Army Signal Corps in the mid-1800s providing the infrastructure for military aeronautics and spawning Army air power during World Wars I and II. Medicine also has made significant contributions to the phenomenal development of military and civilian aviation during this century—contributions to the safety and effectiveness of flight—bringing the entire world closer together and culminating with our manned landings on the Moon.

This symbiotic relationship between medicine and aviation is an Army tradition—stronger and more necessary today than in the past. Each of the two systems has the potential of even greater contribution to the other, toward mutual improvement of both. Together, we must realize this unique opportunity to continue to build upon the success that we have achieved to date.

Actually, there are two sides to our common coin: i.e., *Aviation Medicine*, or the contribution of medicine to aviation; and *Medical Aviation*, or the contribution of Army aviation to medical capabilities, operations and effectiveness.

My interest at this point is one of perspective—to comment on the progress and direction of aviation medicine in this 35th year of Army aviation. Details concerning major activities in aviation medicine are elaborated elsewhere in this issue and in the bibliography provided on page 22.

MG Spurgeon Neel

World War II: Army aviation, officially authorized on 6 June 1942, depended largely upon Army Air Forces' and subsequently U.S. Air Force flight surgeons for aeromedical support for the duration of World War II and the late 1940s. This support was adequate due to the collocation of flying activities, the small number of Army Aviators and similarities in the types of flying involved. During this period the Army Medical Department relied upon the air arm almost entirely for aeromedical evacuation, using large fixed wing aircraft to the rear of the combat zone.

Korea: The Army Aviation Medicine Program was born of necessity during the Korean War. It became clear in Korea that complete reliance upon Air Force flight surgeons to care for Army Aviators was unrealistic in view of the increased numbers of Aviators, forward deployment and type of flying of Army elements. This included the Army's introduction of the helicopter to the combat area

Continued on page 22

Helicopter Aviation Medicine

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EVERYONE "KNOWS" that the U.S. Army had more ships than the U.S. Navy in World War II and that we now have more aircraft than the U. S. Air Force. An expert can be found occasionally who will sagely intone that the Army actually has more aircraft than the rest of the Department of Defense (DOD) put together. While I cannot find an answer to the World War II "ship" question (probably because the Navy considers any seagoing vessel carried aboard another ship a "boat," while many members of their land roving sister service feel that any vessel capable of carrying one or more combat tanks must be a ship), I have found data to dispel the erroneous notion that the Army has a larger fleet than the U.S. Air Force.

These data affirm the ascendency (forgive the pun) of the helicopters in DOD and dramatically demonstrate the change in the Army's concept and execution of the helicopter's role in airmobile warfare.

In fiscal year 75, active service inventories, including Reserve and National Guard units, were as indicated in the box on page 23. (While these are not the latest figures, they do reflect the trend to helicopters, which is still true.)

From these data we see that the Department of Defense distribution is: Army 34 percent, Air Force 43 percent and Navy 24 percent. (Note: Data available does not show a breakout for U. S. Marine Corps.) The table shows that 91 percent of the Army's aircraft are rotary wing (RW) while the Air Force and Navy have 3 percent and 21 percent respectively. DOD as a whole has a rotary to fixed wing (FW) mix of 37 percent to 63 percent.

To preclude confusion it should be noted that the U. S. Coast Guard is a function of Department of Transportation in peacetime and hence its aircraft inventory is not reflected in these DOD figures. The current USCG active aircraft inventory is rotary wing 110, fixed wing 49.

More informative than the above fixed-time data are trend figures which show that between FY 61 and FY 75, the percentage of rotary wing in the DOD fleet trebled (to 37 percent) while the Army mix evolved from roughly 50-50 to its current posture (91 percent RW). From 1963 to 1975 the USCG active inventory evolved from 32 percent RW to 69 percent RW.

Data on numbers of Army Aviators and their ratings parallel the aircraft inventory figures as might be expected. In November 1975 there were 14,686 Army Aviators on active duty. Of these, 9,313 were commissioned (63.4 percent) and 5,373 (36.6 percent) were warrant officers. Of the 14,686 total, 498 (3.4 percent) were FW rated only and 14,188 (96.6 percent) were RW or dual rated. Of 1,103 Army Reserve Aviators, at least 95 percent are RW or dual rated. Although I have no data for the Army National Guard, it is probably safe to assume that a similar distribution exists.

General aviation also reflects significant recent growth in

Continued on page 23

The expanding use of helicopters in U.S. Army airmobile warfare makes the Army Aviation Center the logical place to develop helicopter aviation medicine doctrine

The Flight Surgeon

Daniel T. Sanders, M.D.

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U.S. Army Aeromedical Activity
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SINCE WORLD WAR I, it has been frequently and dramatically demonstrated that flight surgeons are among the most cost-effective specialists in military medicine. Their contributions provide the maintenance of a better performing Aviator which contributes to a significant decrease in aircraft accidents. These results are accomplished by the flight surgeon's wholehearted participation in unit activities of all types, formal and informal, and by personal knowledge of each Aviator. This special information and the flight surgeon's unique training are used to provide the best possible care for the individual Aviator and timely staff advice to the unit commander.

Did you ever wonder where these flight surgeons came from and how they got to be flight surgeons? Usually volunteer physicians enter aviation medicine immediately after completing the basic medical officer course at Ft. Sam Houston, TX. They receive their MOS training and are awarded their wings after completion of the Army Aviation Medicine Basic Course at the U. S. Army Aeromedical Center, Ft. Rucker, AL.

During the 7-week course at Ft. Rucker, student flight surgeons must learn additional clinical medicine in the related fields of cardiology, EENT (eye, ear, nose and throat), ophthalmology (eye), pathology and psychiatry as it applies to aviation and the aviation environment. Additionally, a flight syllabus (5 hours rotary wing, 5 hours fixed wing) with exposure to the stresses Aviators are exposed to in their day-to-day activity is part of the curriculum. The flight surgeon must be familiar with accident investigation and aviation-related administration.

If the flight surgeon completes 5 years of flight surgeon duty and 500

Continued on page 18

U.S. Army Aeromedical Research Laboratory

Colonel Robert W. Bailey, MSC
Director, U.S. Army Aeromedical Research Laboratory
Fort Rucker, AL

THE UNITED STATES Army Aeromedical Research Laboratory (USAARL), a field service activity at Ft. Rucker, is one of eight laboratories of the Surgeon General's Medical Research and Development Command. The laboratory was established in 1962 as the U.S. Army Aeromedical Research Unit to conduct both fundamental and applied research on the medical aspects of Army aviation, parachuting and airmobile activities. In 1973 the laboratory additionally was tasked to perform research to solve Army-wide problems in the areas of vision, hearing, human/machine integration and the medical problems and aspects of nonmedical material.

At this time there are more than 75 different research programs underway at the Aeromedical Research Laboratory. Many are related by a common goal—an attempt to remove those influences upon people which prevent them from maintaining maximum capacity and attention to the task of mission accomplishments in the aviation or field forces combat environments. These distractions include such diverse performance capability limitations as fear of crash injury; heat; cold; uncomfortable seats; noise; vibration; glare; excessive workload; fatigue; monotony; hypoxia; and poor communications. All are under study at the Aeromedical Research Laboratory.

From the laboratory's inception there have been several general research principles which have guided the research program.

- The laboratory has always conducted goal-oriented research to solve operational problems; that is, it strives for some demonstrable benefit for the Soldier or the pilot in the cockpit at the end of the research program. The medical research and development crest carries the motto "Research for the Soldier."
- It is our opinion that one cannot effectively simulate in the laboratory either the psychological or the physiological impact of flying or parachuting. As a consequence, we have, whenever possible, taken our studies and data acquisition systems into the aircraft and the real world rather than attempting to simulate the aircraft in the laboratory.
- As a corrollary, we have always viewed the human as our primary experimental animal. Our direction from one of the early leaders in aviation medicine was, "When they teach the chimpanzees and rats to fly the helicopters, then we'll study the chimpanzees and the rats." In fact we occasionally do use simulation, and we do use a few experimental animals. They are generally used, however, to develop the procedures and techniques which we plan later to use in studies on humans in a flying helicopter, or in occasional experiments where risks of potential injury make the use of humans inadvisable or unsafe.
- We realize we at Ft. Rucker cannot possibly do all the work that needs to be done. Consequently, we have established and maintained close working relationships with a wide variety of other laboratories, military and civilian, U.S. and foreign, which are engaged in aviation related research. This cooperation ensures that we are always aware of work going on in these laboratories which might be

A team employs an ultra sensitive light meter to record reflectivity of various cockpit surfaces and light emission of instruments during day and night. Research will indicate whether the eye is attracted to or tends to overlook certain items if too bright or too obscure

A vibration platform capable of simulating helicopter flight. Purpose is to assess the effect of vibration on bone mineralization and also on eye tracking performance

applicable to Army problems.

One of our scientific associations which has been particularly fruitful has been with the U.S. Navy Aerospace Medical Institute at Pensacola Naval Air Station, FL. This informal cooperation proved so successful that in 1966, The Surgeons General of the two services formalized the arrangement designated as the Joint Army-Navy Aeromedical Research Panel. Since then the panel has been expanded to include the U.S. Air Force, with invited participation by the U.S. Coast Guard and the Federal Aviation Administration (FAA) to review how we might best share resources and work together on problems of mutual interest.

Over the years the size of the laboratory staff has increased from its original seven to its present staffing level of 140 individuals, working in the disciplines of medicine, engineering, psychology, vision and acoustics. This group, by coordinated application of the various scientific systems, is united in its dedication to make helicopter flying by U.S. Army Aviators as safe and as combat effective as possible and to provide research support as requested to the Army field forces.

As tactics change, research direction must also change in order to anticipate and to resolve problems before they reach the field and result in accident statistics or losses in mission capability. For example for the past 5 years programs have been underway at USAARL to study day and night nap-of-the-earth (NOE) flying. More recently the effects of the AN/PVS-5 night goggles, the helmet mounted sights, and the special problems of certain individuals participating in Army aviation have been evaluated.

Several lightweight oxygen systems are being medically evaluated for the Army. They will be used by flight crews conducting sustained flights above 10,000 feet for mountain rescue and high

Continued on page 26

The "Eye Mark Recording System" provides a TV picture of an Aviator's field of vision by producing a bright spot on a screen where the eyes are actually focused. The device is a fiber optic TV camera with image splitting mirrors

WINNING THE WAR ON WEIGHT

Dennis R. Brightwell, M.D.

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Lexington, KY

AVIATORS ARE an unusually bright group. That's an obvious statement—one we accept without question. But when that annual physical rolls around and they are standing there facing the scale—some seem to lose their head, if not their weight.

Strange statements can be heard from the flight surgeon's office:

Gee, doc, I didn't know there was a weight limit.

But I eat like a bird.

It's my wife's fault . . . she fixes such great meals.

Well, to set the record straight, there are maximum weight limits for personnel on flying status. They're shown in figure 1, in case you need to refresh your memory. And eating like a bird may be too much for you, if you only require an insect's portion to maintain your weight. I know your wife's a great cook, but you *can* say no. I don't think she'd be offended by your desire to spend a few more years with her.

Now, about those weight standards . . . they're pretty liberal. Really! Just to give you an idea of how so, the weight range associated with the longest lifespan is shown in figure 2. Compare those for a shocker. Even if you meet aviation standards, you may not meet good health standards. The plain fact is, the heavier you are, the shorter your life expectancy.

You heard this in school. You've read it before here in the *DIGEST*. With all this information, why are so many Aviators still in the same situation? Why is it still so hard to shed those excess pounds?

Those old cliches, such as *just push away from the table, use your will power* or *count your calories* haven't seemed to do the job. Are Aviators that weak willed? Of course not. Perhaps it's been that these suggestions haven't really gotten to the root of your overeating problem. If so, then it's time to look at things in a new way.

In recent years, behavioral scientists have come up with a formula which helps them to understand behavior. It's S→B→E. It says that a Stimulus (S) when followed by

some Behavior (B) is then followed by an Event (E). For example, hunger (an S) is usually followed by eating (a B) which brings about a feeling of fullness and well-being (an E). We've learned this sequence from birth and don't even have to think about what to do when we feel our stomachs rolling.

Emotions can stimulate eating too. You can probably remember eating more when you are angry, tense or under a lot of pressure on the job. Maybe you eat when you've had an argument. But don't go running to your psychiatrist! This is normal. *Most* of us eat in response to these cues *some* of the time. Perhaps you've just learned to do it *most* of the time. After all, food is generally accessible. Eating is an easy response to many pressures.

In addition, eating in the same location over and over again can cause that location to become a stimulus to eating. For example, if you usually eat lunch in the same place, it is a good bet that you will often eat something when you have a coffeebreak in that same room, even if you are not hungry. That's a habit. If you've got too many habits and eat too often in response to cues other than hunger, you may become overweight. It's a pretty simple and easy to understand explanation, no deep dark secrets hidden in your unconscious mind. There are several simple steps which can help you to gain control over your eating behavior, reduce it and thereby lose weight, and result in less grief at physical examination time and a longer and healthier life for you.

First, before any behavior can be changed, you have to know *exactly* what it is. In this case, it means that you need to establish *a baseline eating record.* In any easy-to-carry notebook, record your weight every morning. Then make entries in your book every time you eat. Record the time of eating, record what and how much you eat, note where it is that you eat and list any stimuli which preceded your eating (even if they seem unrelated at the present time). You ought to do this for 2 weeks, and during that time make a conscientious effort not to lose weight. After all, that's not your usual condition. For the

Continued on page 20

Height (inches)	Minimum (regardless of age)	Maximum					
		16-20 yrs	21-24 yrs	26-30 yrs	31-35 yrs	36-40 yrs	41 years and over
60	100	137	143	146	148	151	152
61	102	142	148	151	153	155	156
62	103	147	153	156	158	160	161
63	104	151	157	160	162	164	165
64	105	156	162	165	167	169	170
65	106	160	166	169	171	173	174
66	107	165	171	173	175	177	178
67	111	169	175	178	180	182	183
68	115	173	179	182	184	186	187
69	119	177	183	185	187	189	190
70	123	180	186	189	191	193	194
71	127	184	190	193	195	197	198
72	131	187	193	196	198	200	201
73	135	190	196	199	201	203	204
74	139	193	199	202	204	206	207
75	143	196	202	205	207	209	210
76	147	198	204	207	209	211	212

Acceptance weight (in pounds) as related to age and height for Army aviation

Figure 1

Figure 2

Weights of insured males associated with the highest mortality. Adapted from the *Statistical Bulletin of the Metropolitan Life Insurance Company,* volume 40, 1959

Height (in shoes)		Small frame	Medium frame	Large frame
feet	inches	pounds	pounds	pounds
5	2	112-120	118-129	126-141
5	3	115-123	121-133	129-144
5	4	118-126	124-136	132-148
5	5	121-129	127-139	135-152
5	6	124-133	130-143	138-156
5	7	128-137	134-147	142-161
5	8	132-141	138-152	147-166
5	9	136-145	142-156	151-170
5	10	140-150	146-160	155-174
5	11	144-154	150-165	159-179
5	12	148-158	154-170	164-186
6	0	148-158	154-170	164-184
6	1	152-162	158-175	168-189
6	2	156-167	162-180	173-194
6	3	160-171	167-185	178-199
6	4	164-175	172-190	182-204

Unloading patient from a MAST helicopter belonging to the 54th Medical Detachment (Helicopter Ambulance), Fort Lewis, WA

THE MAST PROGRAM

IN THE SPRING of 1975 two young men were driving from Alamogordo, NM, to the nearby mountain resort town of Cloudcroft, NM. At a sharp curve the vehicle slid out of control and left the road, plunging 300 feet into a steep, narrow gorge. The two occupants were pinned helplessly in the wreckage.

The New Mexico State Police were the first to arrive at the accident scene. Mountain rescuers were summoned and began a steep rappel to the bottom of the gorge. A call for assistance also was made to the 283rd Medical Detachment (Helicopter Ambulance), Fort Bliss, TX, located 75 air miles away.

In 35 minutes the helicopter crew was at the scene. The rescuers determined that a steep vertical descent by the UH-1 helicopter would be necessary. There would be only a minimum clearance for the main rotorblade.

At about the same time that the aircraft was maneuvered down the gorge to the twisted wreckage, the rappelling rescuers reached the battered auto and began cutting away metal.

The paramedic diagnosed one patient as critical and the other as routine. The critical patient had broken bones and deep lacerations complicated by severe bleeding. The paramedic began injecting life-saving intravenous (IV) fluid into both arms of the critical victim.

The aircraft's crew assisted by applying splints and bandages. Both injured men were flown to a hospital and the critically injured man spent 6 months recovering from the near-fatal accident.

The following January, a truck tire exploded at a salvage yard in Chaparral, NM, and critically injured the 18-year-old son of Master Sergeant William A. Flockhard and a young friend who was with him.

By ground transportation, medical help was at least an hour away. A call for help was placed to the William Beaumont Army Medical Center (WBAMC), Ft. Bliss, TX, which was relayed at 1525 hours to the 283rd at its Briggs Army Airfield location.

Within 5 minutes, a UH-1 helicopter was airborne. Twenty minutes later the flying ambulance was on the scene rendering assistance. By 1600 hours the injured were on their way to the Trauma Unit at WBAMC.

These are only two examples of missions handled by the helicopters assigned to the Military Assistance to Safety and Traffic (MAST) program. Both were made by the same unit but other MAST units located throughout the U.S. can narrate similar missions.

MAST supplements the existing emergency medical service system by providing military helicopters, crewmembers, medical equipment and supplies in response to serious civilian emergencies.

Public Law 93-155 officially authorizes the MAST program and establishes the boundaries within which it must operate. Assistance is limited to those areas where military units are regularly assigned and are able to provide such aid. The assistance must not interfere with military missions, and does not allow for an increase of funds required for their operation by the Department of Defense. Also, MAST units cannot be used when regular groundbased rescue squads can be used.

The mountainous terrain around Fort Carson, CO, makes MAST particularly valuable in rescue missions. A scan of the 571st Medical

1. Aeromedic specialist SSG John Calvey prepares to give first aid treatment to two vehicle accident victims on a highway of the Island of Oahm. The 68th Medical Detachment (Helicopter Ambulance) aircraft is in the background. 2. One of the two accident victims is carried on a litter to the waiting medevac helicopter. 3. Onboard, SSG Calvey and crewchief SP4 Jerry James attend the victims. 4. & 5. Helicopters bringing seriously ill or critically injured patients to Honolulu use the emergency landing pad on the Hawaii State Capital grounds. 6. City and county ambulance mobile intensive care technicians assist in unloading the injured

MAST Units Throughout The United States

Fort Rucker, AL

Fort Ord, CA

Fort Carson, CO

McDill AFB, FL

Fort Benning, GA

Fort Stewart, GA

Schofield Barracks, HI

Mountain Home AFB, ID

Fort Riley, KS

Fort Campbell, KY

Fort Knox, KY

K. I. Sawyer AFB, MI

Plattsburgh AFB, NY

Fort Bragg, NC

Fort Sill, OK

Fort Jackson, SC

Fort Bliss, TX

Fort Hood, TX

Fort Sam Houston, TX

Fairchild AFB, WA

Fort Lewis, WA

F. E. Warren AFB, WY

1.

2.

1. Pararescue Specialist (PJ) SGT Donald R. Hollenbeck, preparing a heart attack victim for MAST medevac. 2. Enroute, vital signs are monitored. Cardio beeper is visible on patient's chest. 3. Crew assisting with patient on arrival at the hospital. 4. Patient delivered to coronary care center in Burlington, VT

Detachment (Helicopter Ambulance) log shows many cases in which a helicopter rescue was "the only way to go." The following selections will illustrate.

- *Hoist extraction of seriously injured mountain climber on Mt. Sniffles. Patient had suffered a broken back and the situation was deemed "life or death."*
- *Night hoist extraction of injured climber from Cheyenne Mountain at 9,000 feet mean sea level. Patient had suffered numerous fractures and lacerations and was in a hypovolemic shock.*

But nothing more vividly illustrates the versatility of helicopter rescues than the efforts at flood-devasted Big Thompson Canyon, 40 miles northwest of Denver last August (see "Carson Aviators Play Major Role in Thompson Rescues," pages 24 and 25). Air evacuation was the only means of transporting victims to safety after a reported 12-foot wall of water rushed down the gorge destroying roads and bridges. Fort Carson's Huey and Chinook helicopters were credited with evacuating and providing on-the-spot medical attention to nearly 1,000 people during the weekend effort.

The MAST helicopters were the first on the scene and operated there until other helicopters took over. Thereupon they returned to their normal MAST duties.

The medical profession constantly is involved in MAST missions, helping other people. But once in a while, the medics ask MAST to help one of their own. Such was the case of a rescue made last winter by the 54th Medical Detachment (Helicopter Ambulance), Ft. Lewis, WA.

A 35-year-old physician fell and slid 1,500 feet down Mt. Rainer. He received internal injuries, fractured ribs, a back injury and numerous bruises and contusions. He was suffering from exposure and, indeed, in critical condition. It was 0130 hours when the park rangers received the report of the fall and determined MAST was needed. Due to the darkness and weather conditions, a night rescue was impossible. At daybreak a UH-1 MAST helicopter was maneuvered to a single skid landing at the 9,500-foot level on Wilson Glacier. The patient was transferred aboard and delivered to the St. Joseph Hospital in Tacoma, WA.

Flight time after pickup was 30 minutes and the mission was completed by 0700 hours. A park ranger stated that if it hadn't been for the MAST helicopter, the victim would not have been rescued until the next day. By then it might have been too late.

A continuing problem in the northern sections of the U.S. is the danger of being trapped in automobiles by snow. Often the snow is too deep, and the distance so great, that ground rescue teams are ineffective.

The 4th Platoon, 507th Medical Company (Air Ambulance) at Fort Sill, OK, provided one answer to this problem. Last winter it was called by the Oklahoma Highway Patrol to rescue 22 people trapped on a small two-lane highway about 60 miles north of Ft. Sill.

The night was unusually cold with winds gusting from the north up to 40 knots and the ceiling measuring 2,000 broken. Arriving onstation it was discovered that most of the people had been stranded for several hours. Many of the cars were out of gas from being run to produce heat.

The UH-1 aircraft was landed about 100 feet from the largest group of people and was loaded with seven passengers for the first flight out. It was flown to the small town of Geary, about 5 miles west of the site of operations. There they were met by townspeople with hot meals and warm quarters.

On the second trip seven more people were air evacuated and the crew returned for another pickup. At this time fuel was getting critical and the ceiling was starting to drop. On arrival at the pickup area the crew was told there were eight people remaining. The aircraft was loaded with all eight as the low ceiling and shortage of fuel made it impossible to return.

When the aircraft departed there was a loud barking noise from the passenger compartment. A small poodle, a ninth passenger, had gotten aboard. No doubt, he was glad to get out of the frozen area.

There are times when MAST personnel, as the saying goes, "meet themselves coming and going." This happened to the 326th Medical Battalion at Ft. Campbell,

3.

4.

KY, on the 7th and 8th of last June. The 7th began routinely with the preflight of the two aircraft. But, just before lunch things began to happen.

The "First UP" aircraft received a MAST mission to transport a 1-day-old infant with heart defects and respiratory difficulty from Evansville, IN, to Indianapolis, IN. Later in the day the "Second UP" helicopter responded to a call to assist an aircraft on fire. First UP's crewmembers returned from Indianapolis late in the evening for a bite to eat and a little rest. They got the food but not the rest.

Shortly after midnight (on the 8th) a call was received for a MAST mission to transfer a 65-year-old patient with acute respiratory problems and renal failure from Winchester, TN, to Nashville, TN. Ten minutes after First UP left for Winchester, a second mission was received. There was an urgent need to transfer four units of AB positive blood from Nashville to McMinnville, TN, for use in surgery.

First UP went directly to Nashville where it picked up the blood and delivered it in time to McMinnville. Then the aircraft was flown to Winchester. The patient at Winchester was transferred back to Nashville completing the round-robin flight and First UP returned to home base around 1000 hours on 8 June.

Members of a new First UP crew already had begun their day in a different UH-1 helicopter by transferring a 36-year-old patient with a brain tumor from Ft. Campbell to Nashville. They had not returned before Second UP was on a MAST mission transferring a 38-year-old patient with 60 percent second- and third-degree burns from Hopkinsville to Nashville. As Second UP was arriving back at its home base, First UP was again departing on another MAST mission. This time eight units of type A blood needed to be transported from the blood bank in Jackson, TN, to a hospital in Nashville to be used by seven different patients.

Sometimes during a rescue people are more afraid of the helicopters than they are of the danger around them. This is probably what happened with the 82nd Medical Detachment at Fort Riley, KA, and it almost cost a man his life.

In the early morning hours last July near Howard, KA, a deluge of 12 inches of rain in less than 4 hours had turned normally calm waterways into raging torrents. Houses quickly became islands in the rising waters.

A 30-year-old man was stranded in the attic of one of these houses as the water rose higher and higher into his home. Having earlier sent his family to higher ground and safety, he stayed with the house until escape became impossible.

Fearing that the flash flood would wash the man and house away, and with the knowledge that the current was too swift for rescue by boat, the sheriff of Wilson County phoned the 82nd and requested a MAST mission.

When mission pilot CWO Jack Mullen dropped the red-cross emblazoned UH-1 MAST helicopter through the fog and hovered near the water's surface a peculiar thing happened. The "victim" just stared back at them and refused to leave the house and be rescued.

After hovering for a few minutes, waiting in vain for the man to respond, Mullen was forced to leave to refuel at nearby Independence Airport. Upon return the situation had changed. "The water was a little higher than before," WO Mullen explained. The stranded man lost no time in reaching for the hovering aircraft. He was helped aboard and flown to safety.

A bad storm got the 273rd Medical Detachment, Fort Ord, CA, involved in a rescue of three men in a sailboat in the waters of Monterey Bay off Santa Cruz. The series of events began about 1530 hours when a sailboat manned by three men was sighted off Santa Cruz Yacht Harbor. The harbor master realized the sailboat could not make it into the harbor under the weather and surf conditions so he and another man took a 24-foot patrol boat out of the harbor to warn the sailboat. At a critical point the patrol boat lost power and capsized and the two men had to swim ashore.

Four other men in a fishing boat tried to rescue the patrol boat but had to give up the attempt when they were unable to get a line onto the boat.

By this time the sailboat was in serious trouble and the MAST helicopter was called. Five minutes after the UH-1 helicopter arrived,

Continued on page 27

Aeromedical Transportation for Infants and Children

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Adopted from an article that appeared in the *JOURNAL OF PEDIATRIC SURGERY*, Vol. 10, No. 5 (October), 1975

IN A RECENT YEAR, at least one patient from each of Ohio's 88 counties and three of its contiguous states was admitted to Children's Hospital in Columbus, OH. Most came from central and southeastern Ohio, an area of about five million people and with a maximum radius from Columbus of about 120 miles. Whenever an emergency transfer to Columbus became necessary, traditional procedure obligated the sending institution to transport patients to Children's Hospital with whatever facilities were available. Several distasteful experiences prompted reassessment of this procedure and it was concluded that the receiving hospital should extend its specialized resources by participating in the transfer.

The concept of bringing specialized facilities and personnel to a child requires that the transport team be based at and dispatched from the receiving hospital. Use of a conventional ambulance traveling 100 miles in 2½ to 4 hours is often impractical when round trips are necessary. Helicopters share the door-to-door capability of an ambulance, but can accomplish the same round trip in less than half the time.

Few private institutions can afford their own helicopters, but military reserve units in most states have such aircraft available. Since Columbus has a large Army National Guard aviation facility, and because the Ohio Army National Guard had made its aircraft available for humanitarian purposes in the past, the support of the Adjutant General's Department of the State of Ohio was solicited. The obvious advantages to all parties permitted the development of a joint military and civilian plan to provide an aeromedical transport service for children on a trial basis.

A UH-1H Huey helicopter from the training fleet was equipped and reserved for medical use. This aircraft is a jet turbine powered helicopter with a 220-cubic foot cabin and has a cruising speed of about 90 to 100 mph with a range in the neighborhood of 200 nautical miles. It can land in relatively confined areas with a minimum of problems. The cabin, when modified for medical use, accommodates a pilot, copilot, crewchief, three medical attendants and either an Isolette and litter or three litters or one medical attendant and six litters. Responsibility for ownership, operation and maintenance of the aircraft remained with the Army National Guard. There was no charge to the hospital or patient for the service. The medicopter was housed at a National Guard airfield 4 minutes flying time from Children's Hospital.

The pilots flying medical missions were volunteers from the instructor pilot group of the National Guard. The crewchief was also a registered emergency medical technician who maintained both the medical equipment and the aircraft. The pilots worked out an around-the-clock, 7-day week call schedule.

Experience and the ability to perform under stress are useful attributes for this kind of work, and selected senior house officers and critical care nurses were invited to volunteer for flight duty; 95 percent of those eligible eagerly accepted. They were instructed in use of the equipment, aeromedical techniques and aviation safety procedures. A physician and nurse comprised the medical crew on every flight.

All equipment selected for use had to be capable of operating from a primary and at least one alternate power source. Most of the devices were run on self-contained batteries; but all could accept a 1,000 Hz to 60 Hz inverter to make them compatible with the helicopter circuitry if their batteries failed. The hardware listed in figure 1 was purchased at civilian expense and permanently installed in the helicopter, as shown in figure 2. The transport incubator and kits of drugs and expendable supplies were kept at the hospital.

Dependable monitors were essential for those parameters usually measured visually or audibly, since available light was sometimes inadequate and noise and vibration made hearing difficult. A generous amount of drugs and supplies was necessary in the event a forced landing caused an unexpected delay.

Referring hospitals were supplied with a direct phone number, and the hospital switchboard operator relayed all calls to the chief medical or surgical resident. The situation was discussed with the referring physician and suggestions made for immediate action if appropriate. The final decision to accept responsibility for the transfer was made by an attending physician, either the service chiefs or their designates.

The pilot on call had the option to decline any request on the grounds of aviation safety. If the proposed trip was acceptable to the pilot, the medicopter departed the airfield and landed at the Children's Hospital where the medical crew and essential equipment were loaded. During the flight to the referring hospital telephone contact was established by means of a mobile telephone carried in the aircraft. Precise instructions for preparation of landing areas, time of arrival, etc. were given; and any further discussion of the patient's condition was possible at that time. Upon arrival, the doctor and nurse assessed the patient's condition in the referring hospital, and appropriate treatment continued or was initiated. Only after appropriate resuscitation and stabilization of the patient in the hospital was the return trip begun. Mobile telephone contact was made with Children's Hospital during the return flight so that preparations for further treatment could be made.

This report covers experience of the first 7 months of aeromedical transport, during which 30 requests were received and 22 accepted. In no instance was it necessary to refuse a request because of weather,

Item	Power Source
Cardiac monitor	Self-contained battery; interference-free
Defibrillator	Self-contained battery
Transport Isolette	Self-contained battery
Suction machine	Modified to run on battery
Respirator	Powered by compressed air or oxygen tank
Telethermometer	Self-contained battery
Oxygen analyzer	Self-contained battery
Infusion pump	Self-contained battery
Oxygen tank	—

Essential medical equipment installed in the helicopter. Most is permanently installed and each has an alternate power source or other backup device

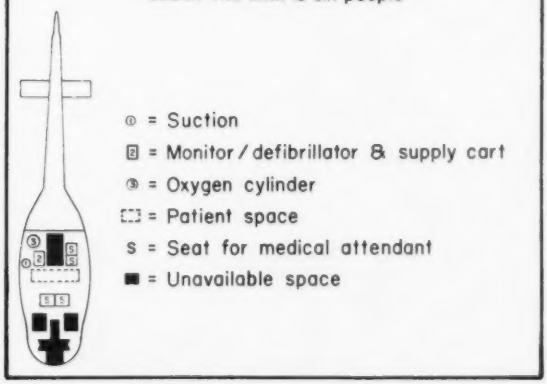
Figure 1

mechanical problems or unavailability of personnel. The eight unfulfilled requests were declined because aeromedical evacuation was thought to be unnecessary after the medical situation was clarified. Such patients were transported by conventional means. The most frequent indications for such transport were surgical emergencies of newborns, severe and usually multiple trauma, and cyanotic heart disease. One patient who sustained multiple trauma was dead before arrival of the medicopter. The other 21 were flown back to Columbus without incident. In 12 of these 21, emergency treatment was necessary before the patient was considered out of danger.

An analysis of elapsed time discloses that if one allows 20 minutes to summon an ambulance and computes its average speed at 45 mph, the helicopter roughly halved the time in which the patient came under specialty care. Daytime responses were faster

Figure 2

A diagram of the aeromedical configuration of the cabin. The limit is six people


① = Suction
② = Monitor / defibrillator & supply cart
③ = Oxygen cylinder
= Patient space
S = Seat for medical attendant
= Unavailable space

because the pilots were at the airfield, but in no case was there excessive delay. All missions were executed promptly and no precautionary landings were necessary. A suitable landing site was found at the local hospitals in all but one instance. No malfunctions of medical equipment occurred, and all patients arrived in excellent condition. All cases were reviewed by disinterested persons after the fact, and each aeromedical transfer was considered appropriate.

The parallel evolution of medical progress and regionalization of care has made the referral of children from community hospitals to pediatric centers commonplace. Advances in transport techniques have been slower, although the experience with helicopter transport of the injured during war conditions in the last two decades clearly has demonstrated the practicality and enormous advantages of this method.

A transfer is ordinarily requested at the time when the local capabilities are inadequate. If the sending hospital had transported the patients in this study, a mean of 2½ hours would have elapsed before their care at Children's Hospital could have begun. The medicopter permitted the same doctors and equipment to reach the children and begin treatment in a mean of 80 minutes. The approach makes far more sense than asking an unprepared referring physician to assume the added problems of moving an already unstable patient. Furthermore, adequately equipped ambulances generally are not available at the referring hospital; and it may be difficult or impossible for a physician or nurse to accompany the patient.

With the use of a helicopter system appropriate treatment begins earlier, the risk of the transfer is minimized and the patient arrives in optimal condition. In at least one case the medicopter transport with its personnel was probably lifesaving. One such patient was a newborn with a large diaphragmatic hernia who was severely hypoxic by the time the medical crew arrived. Road transportation would have required an estimated 3 hours. Initial resuscitation included placement of an endotracheal tube, assisted ventilation, administration of sodium bicarbonate, and warming of the patient. After 2 hours the patient's condition improved enough for flight back to Columbus with treatment continuing; the patient arrived in good condition and was taken directly to the operating room where an uneventful repair was performed. Although it is difficult to point to that dramatic kind of intervention in most other cases, certainly no patient was harmed; and the receiving physicians unanimously agreed that they had never seen similar patients arrive in such good condition.

The aircraft environment has not been disadvantageous to these sick children. The effect of altitude on gas expansion is a negligible problem, since a flying altitude at 1,000 feet above ground level is entirely practical. Cold ambient temperatures are effectively combatted by cabin heaters. Monitoring devices are essential; but noise, vibration and lighting problems are common to all types of transport vehicles. Accident statistics favor aircraft over automobiles. A safe arrival can be expected if the patient is well prepared for the journey.

Our brief experience makes it difficult to set forth absolute indications of contraindications for aeromedical evacuation. Each case should be judged on its own special circumstances. The medical and nursing personnel involved must be enthusiastic about the project, must be available and must be thoroughly skilled in the care of the diseases to be encountered. An understanding of the capabilities and limitations of helicopters and of the unexpected events that can happen in flight is essential. Segal has prepared a compendium of helpful hints [Segal S (ed): Transport Of High Risk Newborn Infants, Canadian Pediatric Society, Vancouver, BC, 1972.] The decision to accept a medical evacuation mission commits a 2 million dollar aircraft and the lives of six or seven people, and obviously this judgment must be carefully made. Agreeing to a transfer request also shifts responsibility for the patient to the receiving hospital, although the patient is not within its walls. There is little precedent for this situation, and firm administrative and legal guidelines should be drawn in advance.

Experience with helicopter transport suggests that it will become a standard mode of patient transfer. Technology will improve; aircraft will become more available; the legal situation will be clarified; and the benefits should prove worth the expense.

Transfer of a critically ill child to a pediatric center is indicated when patient needs have exceeded local expertise or facilities. It is illogical to impose on the referring hospital the added burden of transporting such a patient. The receiving hospital is better equipped to extend its specialized services by assuming responsibility for interim management and transfer of the patient.

An aeromedical transport system capable of quick response was built around National Guard helicopters. In 21 cases doctors, nurses and equipment were flown to children in community hospitals and urgent treatment was begun in half the time formerly possible. Only after the patients were stabilized were they returned safely under continuing appropriate management.

The helicopter is a versatile and speedy tool to deliver talent and equipment when and where needed. Timely arrival of specialty services can be expected to improve patient care and salvage.

New OH-58 Engine

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Two OH-58A helicopters test bed aircraft for the Allison 250-C20B engine, hover to a landing, completing 1,750 hours of test flight on each of the two engines. (Photo by SP5 Edward Voss)

ON 28 JULY 1976 the U.S. Army Aircraft Development Test Activity (USAADTA), previously the U.S. Army Aviation Test Board, Ft. Rucker, AL, Commanded by COL George D. Shields [now retired], completed the latest product improvement test of the turbine engine used to power the OH-58A Kiowa helicopter. These tests began in 1971 and have involved both the Allison Detroit Diesel Division civil model 250-C20 and the 250-C20B gas turbine engines, which are upgraded versions of the T63-A700 military engine in current usage in the OH-58 fleet.

The primary objectives of this latest test were to verify time between overhaul (TBO) and inspection cycles; assess reliability, availability and maintainability (RAM) data.

The 250-C20B engine (military designator T63-A720), at 420 shaft horsepower delivers 103 more horsepower than the present military engine with only an increase of .2 inches in length and diameter and 17 pounds of weight. Although power train limitations restrict the new engine to 317 horsepower maximum, this power can be achieved at higher elevations and hotter climatic temperatures than with the present engine. This assures better operational performance of this light observation helicopter during flight in critical altitude/temperature combinations and will improve its capability in the nap-of-the-earth environment.

The current test program, initiated in 1974 under the direction of CW4 Edward A. Gilmore Jr. (USAADTA Project Officer), has entailed flying 1,750 hours on each of two improved engines. Successful completion of these hours should establish a 1,500-hour TBO for the engine. The T63-A700 has a current TBO of 1,200 hours.

During this engine test a number of "piggy-back" tests also were conducted on the test aircraft to reduce overall test costs. Among these were the hydrofluidic stabilization augmentation system, the temptrol nicad battery overtemperature monitoring system, new types of tail rotor blades and bearings, mixing combinations of engine oils, the infrared suppression exhaust stacks, radar altimeters and several different series of new aircraft radios. A saving of about $60,000 resulted from the "piggy-backing."

AVIATION as a specialty

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SEVERAL YEARS AGO the Army recognized that the generalist philosophy which governed officer personnel development was not adequately meeting the Army's requirements for senior field grade officers. In no small way, this realization was born from pressures originating outside the Army to develop officers capable of managing the various facets of the Army's increasingly complex mission. The generalist philosophy underlying management resulted in our developing officers who were broad gauged but lacked depth in specific areas.

The vehicle chosen for changing the thrust of the system is the current Officer Personnel Management System (OPMS). A key element of OPMS—dual specialty development—was implemented to provide a framework for allowing officers to develop a greater level of specialty expertise than formerly was the case. Today the Army, under OPMS, is exerting a degree of management and direction not previously found in officer professional development.

Retaining aviation as a skill, similar to airborne and ranger, may or may not be desirable from a conceptual standpoint. However, considering the costs involved in training and retaining Aviators; the need for these individuals to maintain their skills; and the concentration of requirements in the company grades, coupled with reduced input to flight training, aviation cannot any longer be supported as a skill.

The aviation specialty has not resulted in all Aviators being thrown into a single pot anymore than they were in the past. Aviators bring to the specialty their unique experience and background which is reflected in their personnel files. Since each position is different, the Army's documentation system provides the field great flexibility in indicating the skills required for any position. Aviation as a specialty in no way stereotypes all Aviators as being of only one variety.

In reality the Army's development and utilization of Aviators within the specialty concept will not differ significantly from what actually happened when aviation was a skill. The designation of officers into aviation and a non-branch related specialty is a reality.

In the past Infantry, Artillery, or other branches did not give recognition to their officers who spent most of their careers in aviation and another specialty, such as personnel. These are the same individuals of today, where the realities of requirements and developed skills are recognized by designating them aviation/personnel. They continue to wear the insignia of their basic branch, attend their entry branch schools and serve in a tactical environment when assigned to a unit which enhances their branch knowledge. The fact that these officers have not

had Infantry as a designated specialty does not mean that their Infantry experience is not cranked into the assignment/selection equation.

Aviators must recognize the need to retain, and even enhance if possible, the ground orientation of Army aviation. They must realize that field grade positions requiring the direct and sole application of combat arms skills are not of sufficient quantity to provide an opportunity for every officer to serve in the ground environment at every grade—Aviator and nonaviator alike.

Military Personnel Center (MILPERCEN) is completing action for implementation of the new OPMS aviation specialty (15). The results of the review board, to consider designations of OPMS specialties for commissioned Army Aviators, were approved by the Deputy Chief of Staff for Personnel on 16 June 1976. Responses from the field indicate a very high rate of satisfaction with the establishment of aviation as a specialty.

The board reviewed proposed specialty designations for 5,303 officers (05 and below) in officer year groups (YGs) 68 and earlier. It made final designations in 215 cases in which Officer Personnel Management Directorate (OPMD) Assignment Division recommendations and officers' preferences were not in agreement. Of the 215 cases, 70 were resolved in favor of the individual. Letters informing individual Aviators of final specialty designations were mailed to supporting military personnel offices (MILPOs) on 19 July 1976. Specialty designations for officers in YG 69 have been processed and were to be mailed to servicing MILPOs on or about 31 August.

Commands in the field have been advised that no permanent change of station moves are planned solely upon specialty designations. It is not intended that officers be reassigned solely for realignment purposes; however, new specialty designations should be a consideration when changes in duty assignments arise.

The Aviation Career Incentive Act (ACIA) of 1974 requires that Aviators serve in operational flying positions a minimum of 50 percent of their careers to remain eligible for continuous incentive pay. Eligibility is determined at the 12th and 18th year of aviation service, called "gates."

Failure to meet the "gates" established by the Aviation Career Incentive Act in no way precludes officers from being considered for command (in any designated or previously designated specialties) nor does it mandate their removal from the specialty. The gate provisions of the ACIA are not yardsticks which are used to measure an officer's worth, but rather they provide an indication of how well the Army is utilizing its Aviators. This act also requires an annual report to Congress which is used to monitor the effectiveness of Aviator management.

Local commands should monitor closely the operational flying status of assigned Aviators and, when possible, provide opportunities for utilization in operational flying positions to those in need of operational flying credit. Information on computing operational flying credit and end fiscal year 74 base data can be found in DA Circular 600-6.

It is planned that priority of assignment to operational flying positions will be:

- Aviators serving an initial 3-year utilization tour or who have less than 4 years of operational flying credit
- Aviators designated in OPMS specialties 15 or 71
- Aviators who have not been designated with specialties 15 or 71 who have completed their initial utilization tour

Commissioned Aviators with more than 8 years commissioned service who have designated primary and alternate specialties other than 15 or 71 will not be utilized in positions identified by specialties 15 or 71.

Professional development of Aviators will change somewhat with the advent of the Aviation Specialty (15). A primary goal is for Aviator management to be integrated into OPMS in such a manner that members of the aviation specialty will be managed the same as members of the other specialties. Some general guidelines follow:

Aviators who have been graduated from initial entry rotary wing (IERW) flight training: These Aviators receive Department of the Army directed operational flying assignments for utilization of their aviation training. Officers normally will serve a minimum of 3 years in operational flying positions after graduation from flight training. This period provides the officer with a professional foundation in Army aviation and ensures a high probability of successfully passing the 12-year ACIA gate.

Aviators who have completed their initial utilization but have not been designated with an alternate specialty: When not in an aviation assignment, these officers should be assigned to duties which will increase their expertise in their basic entry specialty or an advanced entry specialty.

Aviators who have been designated in specialties 15 or 71: Assigned duties should support the officer's primary or alternate specialties whenever possible. Some assignments not related to an officer's designated specialties will continue to be necessary to support requirements. As OPMS develops the right number of qualified officers for each specialty, the need for assignment of officers outside their designated specialties will diminish.

Officers who have been

designated primary and alternate specialties other than 15 or 71: These officers should be assigned duties in nonaviation specialties as soon as feasible. They will continue to be entitled to continuous monthly flight pay as long as they remain eligible under the provisions of the ACIA. To continue this entitlement they must maintain class 2 medical fitness standards for flying duty and successfully complete the annual aviation written examination. They should not anticipate future assignments to operational flying duties unless force structure changes increase requirements for commissioned Aviators.

An extensive evaluation effort will be undertaken to determine if any modifications are appropriate to keep our Aviators "Above the Best." Questions regarding individual officers should be directed to the appropriate assignment division of the OPMD. Questions concerning Aviator management policies should be directed to the U.S. Army Military Personnel Center, Aviation Management Branch, ATTN: DAPC-OPP-V, 200 Stovall Street, Alexandria, VA 22332, or AUTOVON 221-0794.

Flight Surgeon

Continued from page 3

hours of flying time the Senior Flight Surgeon designation and badge are awarded. After a total of 10 years experience, 1,000 hours of flying and certification as an Aerospace Medicine Specialist, the Master Flight Surgeon designation and badge are awarded. The Aerospace Medicine Specialists are few in number and must provide supervision for the young flight surgeons who are the functional components of Army aviation medicine.

Army flight surgeons are one of the most important assets that Army aviation has as it enters this era of highly lethal battlefields and nap-of-the-earth flight. They are:

- essential members of aviation safety programs;
- key members of the unit team fostering high morale and esprit de corps;
- special advisors to the aviation commanders monitoring fitness and fatigue,evaluating life support equipment, providing technical inspection of flight line hazards, etc.

As we continue into our peacetime "stand down" posture with no doctor-draft and an all-volunteer Army, we are in danger of losing this precious asset. The Medical Corps faces a crisis in obtaining adequate physicians in all categories and specifically flight surgeons since it is a voluntary duty. Compounding the crisis is the great difficulty in retaining physicians on active duty. A pertinent aside is that flight surgeons in general and Army Aerospace Medicine Specialists in particular, having been exposed to the challenge of military medicine, have much higher retention rates than most other medical specialties. For example, of the 54 flight surgeons who have been in the Army Aerospace Medicine program, only four resigned their commissions prior to retirement eligibility (93 percent retention).

In the face of known physician shortages in the immediate and foreseeable future, aviation commanders at all levels should continue to request adequate flight surgeon support for aviation units or the flight surgeon may well follow the same route as the battalion surgeon and become a "nice to have but not essential" asset. Not essential? The flight surgeon is notably as essential as the maintenance officer or the safety officer. The 1973 Mideast War demonstrated that the deciding factor can be the ability and proficiency of the individual Soldier rather than the sophistication of the hardware. The individual is still more important than the machine on any battlefield. Just as the maintenance officer focuses on preventive maintenance to keep aircraft from breaking down, the flight surgeon focuses on preventive medicine to keep the Aviator from breaking down. Your flight surgeon is a maintenance officer and is helping to maintain the individual rather than the machine. One of the difficulties stems from the fact that problems are more subtle with people than with machines. The commander must be more astute in recognizing personal performance deterioration and should rely on the flight surgeon's consultation for proper Aviator evaluation.

An inherent function of the unit flight surgeon is the general medical care provided Aviators and, whenever possible, their dependents. Flight surgeons are involved with the dependent care programs to enable them to better assess many of the subtle changes in the Aviator's behavior and health. They do so because they know it is vitally important to the Aviator's performance.

Yes, flight surgeons are a necessary essential ingredient to successful Army aviation.

ATC action line

UNITED STATES ARMY AIR TRAFFIC CONTROL ACTIVITY

AS AN ARMY AVIATOR, what is the impact of a military operation area (MOA) on me?

If you are on a VFR (visual flight rules) flight, extreme caution should be exercised while transiting an area designated as an MOA. Within the published horizontal and vertical limits random or numerous aircraft activities may be taking place. Aerobatics, hooded flight, simulated combat, etc., in the MOA place a greater burden on the nonparticipating VFR aircraft pilot to provide adequate clearance to avoid MOA areas. Information on the activity in MOAs may be obtained from any Flight Service Station (FSS) within 200 miles of the area. If you are on an IFR (instrument flight rules) flight, ATC will clear you to transit the MOA only if you can be provided normal IFR separation from other IFR and participating IFR/VFR traffic.

Are air traffic control (ATC) Letters of Agreement (LOA) reviewed annually by the Department of the Army Regional Representatives (DARR)?

No. It is the responsibility of the ATC facility chief to review all LOAs; however, coordination, as necessary, may be effected with the DARR in the preparation or review of LOAs (FM 1-200).

Does a controlled firing area (CFA) affect any flight that I may make?

A CFA has no affect on any flight made under either VFR or IFR. It is the responsibility of the using agency of the CFA to be aware of when an aircraft penetrates the CFA and to immediately cease all hazardous activity therein.

If a minimum descent altitude (MDA) is raised when a control zone is not in effect, must the added requirement be considered for planning purposes?

Yes. If your planned estimated time of arrival (ETA) for either destination or planned alternate falls into the timeframe in question, the raised ceiling and/or visibility becomes the legal minima for that particular instrument approach procedure. Pilots must then compute the required weather for filing by raising the MDA as required and rounding up to the next 100-foot level. The remarks on the graphic procedure are taken directly from the Standard Instrument Approach Procedure (SIAP) as published in Federal Aviation Regulation (FAR) 97. Army procedures follow FAR 97 rules. Where these remarks are applicable, operating hours of control zones are published on enroute charts and may be amended by Notice to Airmen (NOTAM). The complete list of operating times for controlled airspace is published semiannually in the Federal Register in support of FAR 71.

A REMINDER

For those of you who don't assault the blue too often (or don't check your Special Notices), a reminder that effective 9 September 1976, CODE 3100-3177 series for HIJACK was changed to the single CODE 7500. The change is international affecting the airspace and ATC systems of all subscribing International Civil Aviation Organization (ICAO) member nations.

Weight

Continued from page 7

baseline to be accurate it must be established under typical conditions (no weight loss). You can't cheat on this program because there's nobody checking up on you. It is only for you. You should continue to keep a notebook throughout the rest of the program until you've achieved your weight loss goal.

After the baseline you can analyze your notebook. Look for locations where you frequently eat, or times or emotions or situations that seem to set off eating. One officer found that he drank between 10 and 15 sodas every day. He solved this problem by putting his change in his desk drawer the minute he came to work every morning. Then when he passed the soda machine, which he had to do frequently on his way to and from his commander's office, he didn't have the money to buy that soda. The combination of the sight of the machine and some of the pressure he felt from working so closely with a new commander had been inadvertently triggering increased eating. Once he recognized this, it was an easy matter to change it.

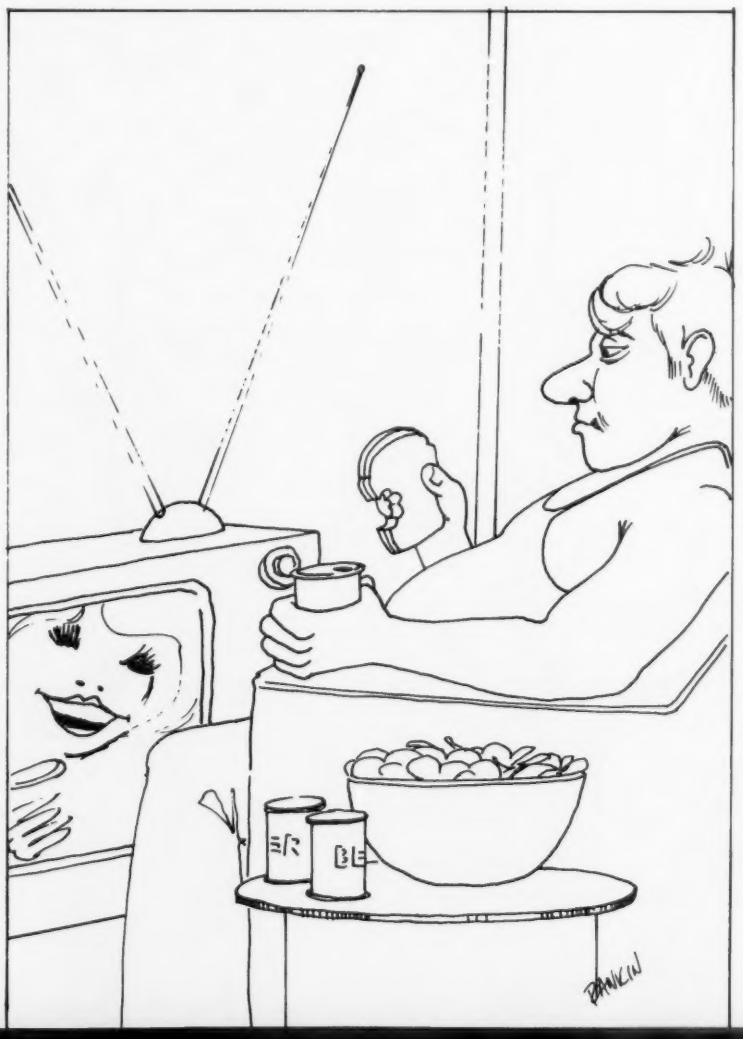
When you've seen how you eat now, its easy to plan how you want to eat later. There are several things which you can do to help yourself respond less to those stimuli and to establish new and more healthy eating habits.

If possible, select a single location for eating and eat all your meals there. You will probably need one specific location at home and one at the office. Don't do anything else while eating.

If you work while you eat or read while you eat, it's likely that you will soon feel the need to eat while you work or eat while you read. You want to keep the number of activities associated with eating to a minimum. Get yourself a new place setting. You needn't go out and spend any money, just pick up some odds and ends around home. Eat all your meals off this complete place setting every time. You want to have a very specific situation associated with eating, and one which is different from your old habit patterns. This not only reduces your exposure to the many stimuli which formerly may have cued eating, but while you're getting the setting out, you have time to think about whether or not you are really hungry and want to have that late night snack.

Eat everything, even that very snack, off the entire place setting. Every time you forget to do this, you weaken the power of this new situation to influence your eating in a more healthy direction. If you have to eat away from the place setting, it is best to take your food with you. Prepare your meals at home, in sight of the place setting, and take the food to work in a sack. If you can't do that, perhaps you can take a portion of your place setting with you and use it at meal times.

Everytime you go through the messhall line, a tremendous amount of food is put on your plate. Perhaps you could slide half of it off before you start to eat your meal. Don't have it in front of you, because the sight of food is a powerful eating cue for most of us. Use your ingenuity; make small changes in your eating routine. Anything you can do to make it different from the way you used to eat should help you gain control



Some additional tips for reducing your response to stimuli for eating. Adapted in part from "A Three-Dimensional Program for the Treatment of Obesity," by Richard B. Stuart, in *Behavior Research & Therapy*, volume 9, page 182

1. Clear your dishes directly into the garbage
2. Allow your children to take their own candy
3. Eat slowly
4. Save one item from your meal to eat later on
5. Swallow all food in your mouth before taking another bite
6. Plan a 5-minute break in the middle of your meal, when you stop eating
7. Chew your food thoroughly, perhaps 15 times per bite
8. Serve your entire meal and put the serving dishes away before you start to eat

Figure 3

over what you're eating in the future.

Reward yourself, and do it frequently and often. Everytime you lose half a pound, you ought to get something for it. Don't wait until you've lost 10 pounds. You really can only expect to lose about a pound a week, and if you only get a reward every 10 weeks, it is not likely that you are going to continue with this program for very long. Perhaps you could put some money away, each time you lose that half a pound, and agree with yourself to spend that money on a hobby or collection. Don't wait to save up $20 or $30. The more frequently you can reward yourself, the more likely you are to continue with this new pattern of eating.

None of us do anything very long for nothing. Once small weight changes come to be associated with rewards in your mind, you will find that it is easier to feel good about yourself when you lose just half a pound a week. Those diets in which you lose 10 pounds the first week aren't good for you and they don't work anyway. If they did, you wouldn't be considering this new program.

And finally, make small changes and make them just one at a time. When you try to change your behavior, it's tough to go from the way you used to eat down to a 1,500-calorie diet in one big jump. The details of your own personal plan are limited only by your own ingenuity. A family member or your flight surgeon may help you think of some additional techniques which would be useful for you. Try to make it fun. If it's a lot of work and very unpleasant, you won't stick with it for very long. Nobody would.

If you need some other ideas look at the things listed in figure 3. You can add these in, but no more than one at a time, and only then when you think the program you've established up to that point isn't working as well as you would like. You should only include those which you don't feel would be very difficult for you. Don't do anything which is going to be a lot of extra work.

You can expect to lose between a half and a pound and a half a week on a plan like this. It doesn't claim to be super fast, but it is a healthy rate of loss. The big difference is permanence. No one could stick with some highly restricted diet for the rest of his life. But using this plan for 4, 5 or more months, can help you to establish a practical, new eating behavior that you can rely on for the rest of your life.

Doctor Looks

Continued from page 1

and another dimension of ground mobility.

The helicopter proved to be the best vehicle to meet the aeromedical evacuation requirements generated by the nature of the Korean War, the climate and the terrain. The accepted advantages of aeromedical evacuation were extended to the battlefield forward of supporting surgical hospitals.

Initially, the Army Aviation Medicine Program emphasized flight surgeon support at the unit and installation level, accomplishing physical examinations, and providing clinical and health maintenance care to Army Aviators. There was complete reliance on the Air Force and U.S. Navy for research, development, education and specialized consultation support.

Vietnam: As the war clouds gathered in Southeast Asia, Army aviation continued to expand. Air mobility permeated all organizational and tactical developments. Requirements for aeromedical support increased in proportion to the capability of Army aviation to provide forward medical evacuation. These requirements were met and these capabilities were fully utilized in the Republic of Vietnam.

On 6 July 1962 the U.S. Army Aeromedical Research Laboratory was established at the U.S. Army Aviation Center, Fort Rucker, AL, with the mission of applied research heavily oriented toward helicopter and airborne operations. This excellent laboratory has achieved wide recognition for its contributions, and is the only separate element of the U.S. Army Medical Research and Development Command devoted primarily to the support of one functional element of the Army—its aviation!

The following papers by the author are suggested to those interested in more details on the subject of Army aviation medicine:

"Medical Considerations in Helicopter Evacuation," U.S. ARMED FORCES MEDICAL JOURNAL, 5:220-227, Feb 1954.

"Helicopter Evacuation in Korea," U.S. ARMED FORCES MEDICAL JOURNAL, 6:691-702, May 1955.

"The Adaptability Rating for Military Aeronautics," U.S. ARMED FORCES MEDICAL JOURNAL, 6:1005-1010, Jul 1955.

"The Army Aviation Medicine Program," U.S. ARMED FORCES MEDICAL JOURNAL, 6:1341-1348, Sep 1955.

"The Medical Aspects of Army Aviation," JOURNAL OF AVIATION MEDICINE, 26:304-307, Aug 1955.

"Aeromedical Evacuation," ARMY, 16:9:30-33, Apr 1956.

"Army Aeromedical Evacuation," U.S.ARMED FORCES MEDICAL JOURNAL, 8:1195-1200, Aug 1957.

"Noise and Vibration Exposure of Combat Zone Evacuees; An Investigation of Field and Helicopter Ambulances," Research Report, USAF School of Aviation Medicine, May 1959.

"Aviation Medicine Contributes to Flying Safety," *U.S. ARMY AVIATION DIGEST*, 7:9; inside back cover, Sep 1961.

"Army Aviation Medicine; Part VIII of The Army Aviation Story," *U.S. ARMY AVIATION DIGEST*, 9:1:34-39, Jan 1963.

"Medical Evacuation, Part IX of The Army Aviation Story," *U.S. ARMY AVIATION DIGEST*, 9:2:33-41, Feb 1963.

"Army Aeromedical Evacuation Procedures in Vietnam; Implications for Rural America," JAMA, 204:4:309-312, Apr 1968.

"Medical Support of the U.S. Army in Vietnam, 1965-1970," Washington, DC, U.S. Government Printing Office, 1973.

Concurrently, a Department of Aeromedical Education and Training was established within the U.S. Army Aviation School at Fort Rucker with the mission of training the greater number of flight surgeons required to support air-intensive operations of the U.S. Army in Vietnam. Improved physiological training also was provided to Aviator students flying more sophisticated aircraft with greater stresses.

Aviation units of company size or larger deployed to Vietnam had organic or attached flight surgeons and medical detachments providing the entire gamut of aeromedical and general medical services with full support of research, educational and consultation capabilities at the Aviation Center.

Helicopter evacuation, which grew up in Korea, reached full maturity in Vietnam and was a major factor contributing to the excellent care provided to our wounded and seriously ill. This experience subsequently has been applied to the major problem of dealing with trauma in the civil sector through Project MAST (Military Assistance to Safety and Traffic).

The helicopter is accepted as the preferred method for evacuation of seriously disabled patients from the point of injury directly to the medical facility capable of providing the care that is required. Less apparent, but of equal importance, is the tremendous contribution of reliable helicopter evacuation to more effective medical support operations, and more efficient use of critical and expensive

medical resources. In Vietnam we demonstrated that a medical support system integrating helicopter evacuation is not only best for our casualties, but also is economically competitive with a system without helicopters—total costs considered.

The medical-aviation dialogue was most visible in Vietnam. The largest medical operator outside of the 44th Medical Brigade was the 1st Aviation Brigade. Similarly, the largest nondivisional operator of helicopters other than the 1st Aviation Brigade was the 44th Medical Brigade.

Quo Vadis: On 1 April 1974 the U.S. Army Aeromedical Center was established at Fort Rucker as a major subordinate activity of the U.S. Army Health Services Command. This functional center combines Lyster Army Hospital with the former Department of Aeromedical Education and Training of the Aviation School, and provides complete aeromedical support to the Army on a worldwide basis. It is a unique medical capability dedicated to the support of Army aviation.

I am confident that the future projects even greater interdependence between medicine and aviation in the Army. The Army has clear preponderance in the field of helicopter operations. Concurrently Helicopter Aviation Medicine (HAM) is emerging as an identified subspecialty in the field of aerospace medicine, with the Army providing the leadership and impetus at the national and international level.

Airmobile operations on the battlefield of the future involve stresses not experienced in the past—the sophistication of aircraft; the intensity of combat; the tactics of employment (nap-of-the-earth employed both day and night). Aeromedical support must be equal to the challenge—in development of equipment and techniques, in training and in operations. The stakes are high!

Medical support systems of the future will place considerable reliance on organic aeromedical evacuation in accomplishing the traditional mission of saving lives and conserving the fighting strength. The helicopter clearly provides the common denominator to resolving major medical problems likely to be presented by the next war. Formal studies such as the Theater of Operations Medical Support System (TOMSS) and the Division Restructuring Study (DRS) will involve full emphasis on the capabilities of aeromedical evacuation in developing the preferred, and affordable, medical support structure for the next decade.

I am as optimistic of our future as I am proud of our past. Medicine and aviation have a good thing going in the Army—it is exciting and gratifying to be part of it!

HAM *Continued from page 2*

numbers of helicopters as civilian industry and officials further capitalize on the remarkable operational flexibility of this extraordinary machine. For example, from 1970 to 1974 while the general aviation fleet as a whole increased 22.2 percent, the rotary wing portion of that fleet more than doubled from 2,682 to 5,382. On 31 December 1974, Federal Aviation Administration (FAA) recorded 28,608 active helicopter pilot certificates compared to 20,896 in 1969.

Obviously the current realities of Army aviation have significant impact on Army aviation medicine which has, de facto, become primarily helicopter aviation medicine (HAM). To a greater extent that I had thought, Navy aviation medicine has become HAM and that trend is probably continuing in recognition of both the Navy's and the U. S. Marine Corps' needs. Although only 3 percent of the USAF aircraft fleet is RW, helicopters in more or less small numbers are assigned to a large number of Air Force bases and hence HAM is, or should be, widely practiced in the USAF (at least in the geographical sense). While support of general aviation helicopter pilots is more diffused than that of the Department of Defense, more and more FAA aviation medical examiners are becoming aware of helicopter operations by necessity.

	Army	Air Force	Navy	DOD Total
Fixed Wing	767	10,858	4,941	16,566
Rotary Wing	7,968	338	1,306	9,613
Total	8,735	11,196	6,247	26,179

Since helicopters have become a significant and growing part of our aerospace industry because of ever increasing military and civilian demands, HAM has become an increasingly important aspect of the specialty of aerospace medicine. Because of its unique position as part of the "Center Team" at Fort Rucker, Army aviation medicine must accept the challenge and provide worldwide leadership in developing and promulgating HAM concepts, education and training and research.

1. SP6 Karl Winterrowd scans Big Thompson Canyon for signs of survivors

2. Aftermath of the Big Thompson Canyon flash flood, west of Loveland, CO

3. An elderly lady is assisted aboard a CH-47 Chinook during the rescue operation

4. The debris attests to the force of early morning flash flood

5. The flood washed this cottage downstream into a concrete foot bridge

Story and Photographs by
Fort Carson Public Affairs Office

Carson Aviators Play Major Role In "Thompson" Rescues

MSG Floyd O'Neal

6. Volunteers rush an injured person off a CH-47 Chinook at the receiving station

7. Nearly every bridge and manmade structure was destroyed or damaged

8. The huge wall of water washed away section of highway 34

FOUR AIRCREWS FROM Ft. Carson, CO, flew a total of 34½ hours on Sunday, 1 August 1976, in support of rescue operations in the flood-ravaged Big Thompson Canyon about 40 miles northwest of Denver. The four crews logged 280 sorties (round trip missions) on that single day.

Two CH-47 Chinooks from the 179th Aviation Company and two UH-1H Hueys from the 571st Medical Detachment (Air Ambulance) at the mountain post outside Colorado Springs were credited with evacuating and providing on-the-spot medical aid to about 1,000 people during their weekend effort.

The Military Assistance to Safety and Traffic (MAST) aircraft had been released from the effort Sunday evening.

On the next day, 2 August, the Chinooks, which had remained onsite in Loveland, assisted with the extraction of another 104 persons when the weather broke for a short period late in the day.

Ft. Carson's 43rd Support Group provided a water purification unit, several water tankers and 38 personnel to provide potable water for the area because severed sewage lines in the area had made all natural water unusable.

Early 1 August, the 4th Aviation Battalion (Provisional) from Ft. Carson provided an OH-58 light observation helicopter to the U.S. Army Corps of Engineers for a 4-hour damage assessment flight over the stricken area.

One aircraft from D Troop, 10th Cavalry, 4th Infantry Division (Mechanized) at Ft. Carson flew to the site Tuesday, 3 August, and remained to support members of the Federal Disaster Assistance Agency until cleanup operations were completed.

In addition to Ft. Carson support, the U.S. Army National Guard at Buckley Field, near Denver, provided four UH-1s, and the U. S. Air Force provided two medical helicopters from F. E. Warren Air Force Base, Cheyenne, WY.

Aeromedical Research

Continued from page 5

altitude surveillance missions, and patient therapy during aeromedical evacuation.

Two totally different oxygen concepts are involved. One is a system which generates 100 percent oxygen from sodium chlorate candles. The other is a system which concentrates oxygen from engine bleed-air to produce an oxygen enriched breathing medium of up to 95 percent oxygen at sea level.

Many items of emergency medical equipment have been tested for use in helicopter air ambulances. Common helicopter problems such as vibration; noise; weight; space and power limitations; electromagnetic interference; and poor illumination make much commercially produced emergency medical equipment totally inadequate for inflight use.

We recently have completed studies on three new high speed hoists for use in patient evacuation. Also a novel method of treating hypovolemic shock for battle injury developed at USAARL has proven to be remarkably effective in emergencies in the hands of civilian medical technicians.

The present Type A classified SPH-4 helmet was developed at USAARL in association with the Naval Aerospace Medical Institute. Studies have been completed for more than a year which can provide aircrews with an improved second generation helmet to correct some minor deficiencies in design which have been identified by careful study since its introduction in 1969.

A DA regulation, and joint efforts with the U.S. Army Agency for Aviation Safety, provide USAARL with all personal flight equipment after every U.S. Army aircraft crash which causes injury or death. By collation of the material obtained from the crash investigation, hospital and other medical records, and data retrieved from a bioengineering study of the recovered personal equipment, a judgment can be made about whether the flight protective gear succeeded in reducing injury and if not, why it failed. It is from such data that recommendations for product improvement such as those for the SPH-4 helmet have been generated.

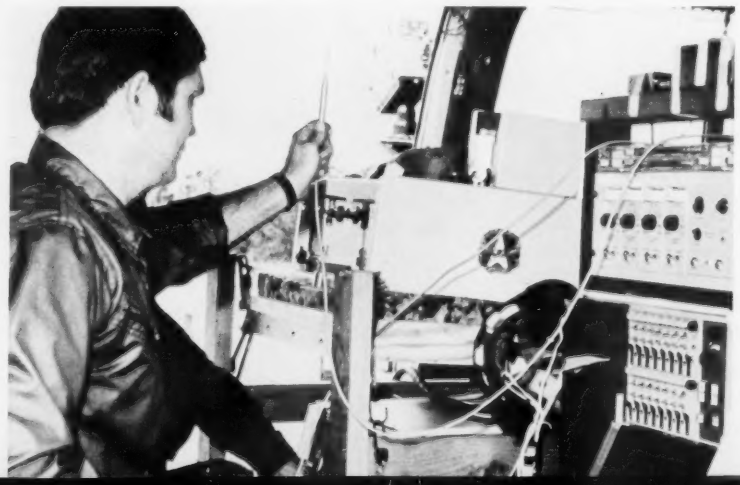
A number of studies are evaluating pilot performance during NOE flight, both day and night. The visual difficulties of this new flight profile are receiving special attention, especially when the AN/PVS-5 night vision goggles are utilized.

A reduction in sound pressure levels at the ear generated by communication systems can protect the aircrew against this source of unnecessary hearing loss. A new generation of noise cancelling microphones and an improved communication design concept by USAARL have stimulated the development of a radio/intercom system which could also greatly increase speech intelligibility in flight.

In collaboration with the U.S. Army Agency for Aviation Safety, a crashworthy troop seat was designed and fabricated which will greatly improve survivability for passengers in the crashing helicopter. A seat of similar design will be standard equipment in all utility tactical transport aircraft systems. The laboratory efforts for the groundpounder may be of less interest to the aviation community, but USAARL has been consulted and is working on such diverse projects as the new paratrooper helmet, mechanized Infantry combat vehicle and the XM-198 (Howitzer) among others.

We could not enumerate all the varied programs under study at the U.S. Army Aeromedical Research Laboratory but chances are, if there is something about flying or the aircraft that *really bugs* you, we're working on it. After all, we fly too.

Rotor blade downwash and noise levels are recorded outside of a hovering UTTAS



Researcher holds a condenser microphone that measures cockpit noise. In the center background a mass spectrometer samples noxious contaminants in cockpit air to which Aviators are subjected. The test vehicle is the UTTAS

MAST

Continued from page 11

the first man from the boat swung himself aboard the rescue bar. In a few minutes he was safe on shore. After that the other two were lifted off the boat. Within 15 minutes of its arrival on the scene the three men were safe on shore.

The Air Force also has had its share of interesting MAST lifesaving missions. One patient suffered two cardiac arrests and was twice revived by cardia pulmonary resuscitation (CPR).

The patient had his first cardiac arrest in the hospital at Elizabethtown, NY, and was revived. Detachment 18, 39th Aerospace Rescue and Recovery Squadron (MAC), Plattsburgh Air Force Base, NY, was asked to fly him from Elizabethtown, NY, to Vermont Medical Center in Burlington, VT. While enroute, the patient suffered another cardiac arrest and was again revived by CPR. Had he been transported by ground ambulance he probably would have died. The 19-minute flight versus the 1-hour, 30-minute ambulance ride graphically illustrates the time saving provided by MAST units.

As of 6 September MAST had flown 8,231 missions, serving 8,613 patients

In May 1975 Detachment 2 of the same unit had a particularly "hairy" mission. On a rainy, foggy Saturday afternoon, the Michigan State Police, along with a local ambulance, responded to an injured individual in the woods near a railroad bridge. A 20-year-old man had fallen 25 feet out of a tree and was nestled on the side of a 100-foot ravine, badly injured. Police and ambulance personnel on the scene were unable to reach the victim, who was located more than a mile from the nearest road.

To reach the victim, a crewmember was deployed by hoist and administered first aid while the UH-1 helicopter orbited. The stokes litter was lowered and the man was raised 125 feet to the helicopter. He was found to be severely injured, suffering from a broken rib, collapsed lung, basal skull fracture and a broken nose. Aboard the chopper he required oxygen, suction and IV treatment.

Last February a request to the Air Force's 37th Aerospace Rescue and Recovery Squadron (MAC), at Warren AFB, WY, came in from the Albany County Sheriff's Department. The mission was to evacuate a 24-year-old woman who had been injured in a snowmobiling accident. The location was in the Snowy Range area of Medicine Row National Forest at an elevation of 10,500 feet and 4 miles from the nearest road. The victim was reported to have numerous fractures plus possible internal injuries. Due to the extent of the injuries, evacuation by ground was impossible.

To reach the scene, the UH-1 aircraft had to circumnavigate snow showers in 10,000-foot mountain passes. The landing area was described by the pilot as being a circular shaped clearing about 30 yards in diameter, surrounded by trees about 30 feet tall. The snowmobiles were used to pack the loose snow to eliminate the possiblity of a white-out condition.

The patient was loaded and takeoff accomplished at 1730 hours. The helicopter arrived at Ivinson Memorial Hospital, Laramie, WY, at 1745 hours. The time from arrival at the scene to delivery of the patient was only 25 minutes, which reflects the quickness of air evacuation as compared to ground evacuation.

Another significant mission involved transporting a 7-year-old burn victim from Ivinson Hospital in Laramie, WY, to Colorado General Hospital in Denver. This was the first burn victim delivered to the new Regional Burn Center. Under the federal guidelines concerning burn victims, any person

SP5 Ken Ryce applies first aid to an accident victim before transporting him to the hospital

with more than 10 percent of the body burned and 60 miles from the burn center, must be air evacuated. This mission fell within the criteria of 30 percent burned and 115 miles.

On at least two occasions, the Army's 4th Platoon 498th Medical Company (Air Ambulance), Ft. Jackson, SC, successfully transported critical heart patients who, under normal circumstances, even in a helicopter, probably never would have made it. The 498th's UH-1 MAST helicopter uses a special heart-lung machine, specifically built for aeromedical operations. The machine was developed by Dr. Arnold J. Lande, assistant professor of thoracic surgery at the Medical University Hospital, Charleston, SC, and two assistant specialists. It produces a steady supply of fresh oxygen to the blood.

On the first trip Dr. Lande went along to observe the use of the machine. The patient was in deep shock when brought onboard the aircraft. However, after being "hooked up" to the machine during flight, the patient's condition stabilized. This may be the first

time a MAST unit has used such a machine and it certainly was a significant medical breakthrough in South Carolina.

The concept of MAST is based on emergency type medical evacuations performed in the Republic of Vietnam by Army helicopters and is intended to be used primarily for onsite pickups at accident scenes. However, in the Ft. Rucker, AL, area the great need has been for high-speed transfers between hospitals, either of patients, blood, organs, medicine or equipment.

In July the Air Ambulance Branch of Ft. Rucker's Lyster Army Hospital, responsible for MAST missions in the Wiregrass area of Alabama, Georgia and Florida, received its 200th request. Only 10 of these 200 were onsite pickups. Among the reasons for so few onsite pickups in the Ft. Rucker area are the efficiency of vehicular crash-rescue squads which serve the neighboring cities and the many good connecting highways that crisscross the area.

Major Robert E. Richards, chief of the Air Ambulance Branch at Ft. Rucker, says that each of the UH-1 helicopters in his unit carries various "additional" equipment in the off-chance that it may be needed. If not needed, it can be removed to make room for patient litters. Major Richards states that the relationships between the civilian and military communities are so good that the branch has never lost an item that has been left behind: "The rescue squads, the police or local residents look after it for us until we come back for it."

Such a spirit of cooperation between the civilian and military communities is demonstrated by the Air Ambulance Branch's 200th mission. Major Richards explained, "The job was to move a patient from a hospital in Elba, AL, to one in Birmingham. Near Montgomery the patient's condition worsened. The pilot contacted a Montgomery hospital and received permission to bring the patient there for emergency treatment. After treatment was rendered the hospital even provided a nurse to accompany the patient to Birmingham."

Citations and letters of appreciation attest to the fact that fine relationships exist throughout the country between MAST units and civilian communities. Last spring a butane truck exploded in Eagle Pass, TX. Ten people were killed and 40 injured. Eleven of those injured were in critical condition.

The 507th Medical Company at Fort Sam Houston, TX, was asked to help. Six aircraft were dispatched with instructions to pick up medical technicians and to transport crash victims from the scene. Seven trips were made from Eagle Pass to San Antonio, carrying 22 injured people.

Many letters of appreciation came in. Representative Abraham Kazen Jr. of the 23rd District of Texas said, "Be assured of my continued support of the MAST program and of my deep appreciation for your aid to people in need . . . ."

A unit of the 326th Medical Battalion, Fort Campbell, KY, is seen briefing TVA personnel. TVA has shown a great interest in MAST

Texas Highway Patrolman Ken Phillips wrote to say, "I hope the MAST program will be expanded to include other areas in Texas that are remote from expert medical care."

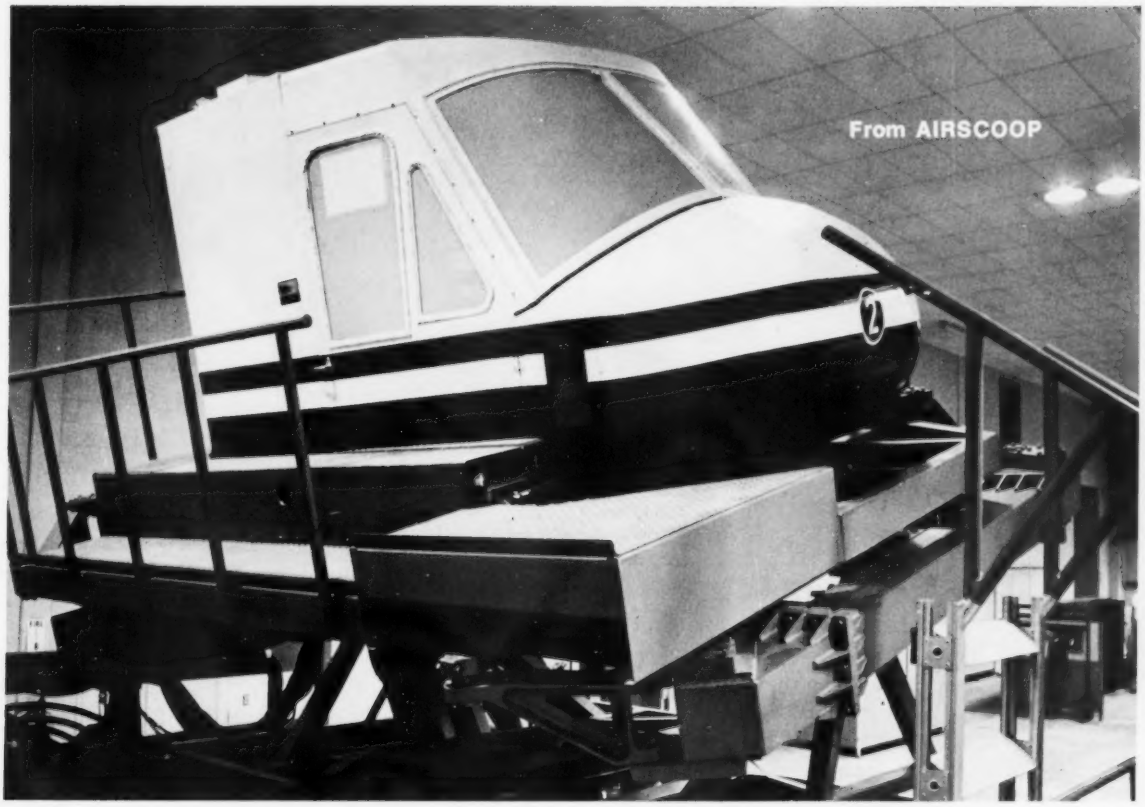
Shortly after the Eagle Pass incident the Alamo Area Council of Governments presented a plaque to the 507th for its 5 years of lifesaving MAST helicopter service to the region. The citation said that during this time, MAST had flown 1,610 patients in 1,449 separate missions.

SP5 Kenneth R. Ryce, a flight paramedic with the 283rd Medical Detachment, was awarded the Army Commendation Medal for lifesaving, largely for his efforts while assigned to MAST duties. SP5 Ryce also was chosen as the Fifth Army Aviation Soldier of the Year. The citation for the Army Commendation Medal for lifesaving states that his quick response and excellent care of the son of MSG Flockhard was a definite deciding factor between life and death of the injured boy.

Last January the Greater Plattsburgh Chamber of Commerce, Plattsburgh, NY, honored the Air Force's Det 18, 39th Aerospace Rescue and Recovery Squadron (MAC) with its Humanitarian Award of the Year for its MAST services to the civilian community. In conjunction with this award the mayor and city council of Plattsburgh declared the week of 12 January 1976 to be MAST Week.

On 23 March a joint session of the Vermont State Legislature passed a unanimous resolution honoring Detachment 18. Additional recognition came from Governor Hugh Carey of New York and Congressman Robert C. McEwen (NY) and also the Chambers of Commerce of Lake Placid, NY, and of Malone, NY.

Because of the dedication, courage, enthusiasm and professional skill of the assigned personnel, MAST has been a huge success. It has proven its worth in saving lives, obtaining prompt medical attention for seriously injured and reducing suffering. It has also brought the military and civilian communities closer together and in this way improved the overall strength of our country.



The Professional and the Simulator

EVERY TIME a professional aviator climbs the step into a simulator, he has the chance to learn something new about himself and his "bird."

He sees the simulator for what it offers—a safe opportunity to enlarge knowledge, increase skills, reinforce correct procedures, and test reactions and logic.

For the professional, the challenge of the simulator parallels that of using an aircraft well. It isn't something to do instead of flying. Rather, it is a part of training activity that is integrated into the flying game to help a pilot fly more proficiently and safely.

Positive Attitude

A positive attitude can go a long way in a successful and valuable trainer ride. Even if the stick doesn't feel exactly like the aircraft, and the instruments don't have exactly the same response—every aircraft has its idiosyncrasies—a competent aviator must adapt to them and fly anyway.

What other aircraft can you freeze at 30,000 feet while you talk through procedures? In what other aircraft can you record all your flight decisions, along with your flight path, then park at 10,000 feet to discuss the problems before continuing the flight?

Get the Most

To get the most out of your flight:

- Spend a few minutes to plan or preview your flight.
- Run a short, but semiformal briefing with your crew or operator.
- Check the pubs.
- Strap yourself in.
- Follow checklists.
- Use standard radio terminology.
- Strive for precision in instrument control.
- Make things tougher than an actual flight.

Captain Michael E. Herndon and Captain Kent N. Graham

Directorate for Technical Research and Applications
U.S. Army Agency for Aviation Safety

The 5C Recipe For Inadvertent Soup

FROM 1 January 1971 to 10 February 1976, 48 Army aircraft crews encountered weather conditions with which they were not able to cope. Of those 48 mishaps, 47 were classified as nonsurvivable and one was classified as partially survivable.

The cause of these mishaps is often labeled unintentional flight into instrument meteorological conditions (IMC). It appears that inadvertent IMC mishaps do not discriminate between the inexperienced and the experienced aviator. These inadvertent IMC mishaps should be of great concern to the aviator and the aviation manager because they are so devastating. IMC mishaps seldom result in only a broken skid or a bent wing. They almost always are catastrophic in terms of lives lost and equipment destroyed.

These occurrences seemingly defy all logic. How can an aircraft be clear, blue and 22 at one moment and inadvertently IMC the next? Obviously, aviators and commanders are neglecting some key element in VFR flight procedures. What is this elusive element? It is more than just apprising aviators and commanders of the inadvertent IMC problem. Too often, the position is taken that there is no such thing as inadvertent IMC and, much like an ostrich, we have covered our heads and hoped the problem would go away. However, the fact remains that we are losing personnel and equipment because of inadvertent IMC. Rather than hoping that this problem will go away, we must first recognize it as a problem and, secondly, go about finding a means of solving it.

Unintentional flight into instrument meteorological conditions has long been a problem for Army avia-

tion. Ironically, the large number of inadvertent IMC mishaps tends to follow closely the development of our new terrain flying tactics for the high threat environment. Terrain flying techniques will enhance the survivability of Army aircraft on the battlefield of tomorrow. However, our techniques for dealing with inadvertent IMC at terrain level have not proven to be adequate. Although FM 1-1, Terrain Flying, proposes a new approach to the inadvertent IMC problem, we find that many unit SOPs still contain the old cure-all guidance of "execute a 180-degree turn." Successful transition from visual meteorological conditions to instrument meteorological conditions requires the logical application of a step-by-step procedure to avoid loss of control, confusion, and more importantly, a catastrophic mishap.

Analyses of aircraft accident reports have identified task errors that occur frequently in inadvertent IMC mishaps. Identification of these task errors led to the development of an inadvertent IMC

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procedure which has been labeled the 5C's: control, coordinate, clearance, course and call. The 5C's will give the inadvertent IMC pilot what the 4T's (time, turn, tune, talk) give the instrument pilot. As is true with the 4T's, the 5C's by no means provide the ultimate solution. What this procedure does is provide an organized method that all aviators can remember when confronted with inadvertent IMC.

Whether or not all 5C's will apply in each inadvertent IMC circumstance will depend on existing conditions, e.g., terrain, obstacles, etc. Nevertheless, the 5C's contain all the necessary ingredients to decrease the occurrence of inadvertent IMC mishaps.

The time to plan for an encounter with inadvertent IMC is before, not during, the encounter. The 5C procedure is easy to remember and could be well worth the time it takes to do so.

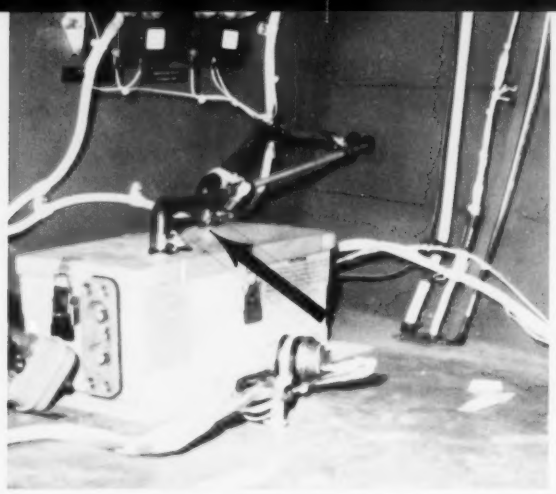
1. **CONTROL**—Establish positive aircraft control. Maintain straight and level flight by use of flight instruments.
2. **COORDINATION**— Establish beforehand that the pilot at the controls will concentrate only on his flight instruments. The copilot is to monitor the instruments and advise when visual conditions are again encountered.
3. **CLEARANCE**—Ensure clearance above the highest obstacle; gain required altitude with a straight controlled climb.
4. **COURSE**—Select and turn to appropriate heading.
5. **CALL**—Make required radio calls for necessary assistance. Coordinated radio frequencies should be specified and posted in the aircraft.

These 5C steps, while basic to all inadvertent IMC procedures, should be modified to address low-level flight as opposed to flight at altitude and type of terrain involved.

Ted Kontos
Publications and Graphics Division
U.S. Army Agency for Aviation Safety
USAAAVS

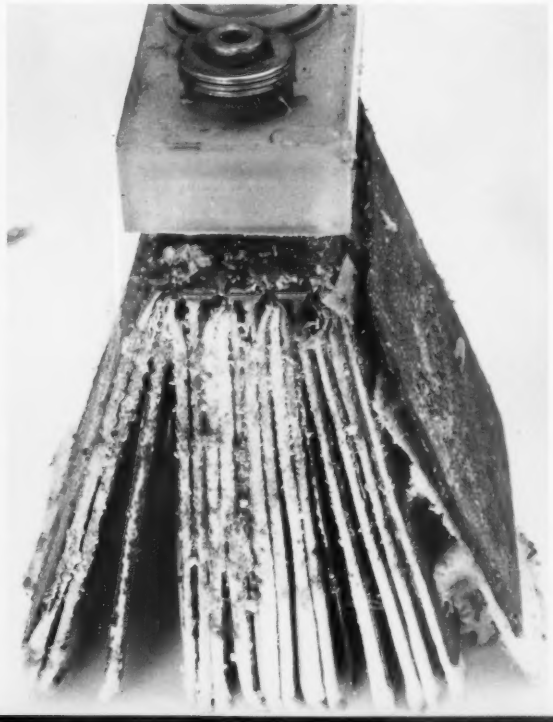
The only sure way to find success before work is to locate it in the dictionary; and the only sure way to prevent battery failures and obtain maximum benefits from our nickel-cadmium batteries is to expend a little more energy in that direction and look on. . .

THE POSITIVE SIDE



Above photo shows OH-58A battery installation. Arrows point to neck of vent line found plugged from a combination of spilled electrolyte and dirt accumulation

High temperatures, plugged filler cap vents and failure to service and maintain the battery as specified in the technical manuals have contributed to the present nickel-cadmium battery problems



MUCH HAS BEEN said and written about the nicad battery, and by now, Army aviation personnel should be well versed with its advantages and disadvantages as well as with its peculiarities. Yet, despite our knowledge, we continue to have battery problems. And almost all involve excessive heat buildup within the cells.

Of 25 recent nicad battery-related mishaps, randomly selected, overheating of the cells occurred in 23. In one of the two remaining instances, the alternator failed; in the other, the battery access cover came off in flight and struck a main rotor blade, causing incident damage.

Thermal runaway was confirmed in three instances and suspected in five others. In seven additional instances, voltage regulators were found to have been adjusted too high. Improper servicing of batteries, including overfilling of cells, contributed to battery problems.

It appears that despite what we know about the care nicads require, we seem reluctant to provide it. Yet, this is not due to any laziness or indifference. In all probability, it stems from failure to completely divorce ourselves from the type of thinking we have come to associate with the lead-acid battery—something we must do if we are to fully realize the benefits afforded by nicads, ensure their reliability and eliminate any threat they can pose to the safety of personnel and equipment.

Consider, for a moment, a nicad battery that is supposedly serviceable. The housing may be clean and intact, but how can we be certain of its condition? Can we check the voltage of the cells? We can, but unless a cell has given up the ghost, this action will not give us any indication as to the battery's state of charge. One of the advantages of a nicad is that it will deliver a constant voltage until it approaches its discharged state. Therefore, the very advantage we enjoy effectively camouflages the true condition of the battery.

Likewise, we might consider checking the specific gravity of the electrolyte. But this action, if carried out, will not give us any more clues as to the battery's condition than the voltage check did. Unlike the specific gravity of the electrolyte found in a lead-acid battery, that of the nicad remains constant regardless of the battery's state of charge; for it does not participate in any chemical reaction but serves merely as a conductor. This is actually another advantage of the nicad in that its ability to function in cold weather does not diminish with its state of charge. Again, a desirable feature masks the battery's condition. How, then, can we know for certain that a battery is fully charged, healthy and ready for use? For this bit of information, we must go to the battery shop—the medical center for both healthy and ailing batteries. It is here that physical examinations are conducted, tests made, transfusions given, and when necessary, surgery performed to maintain or restore battery health.

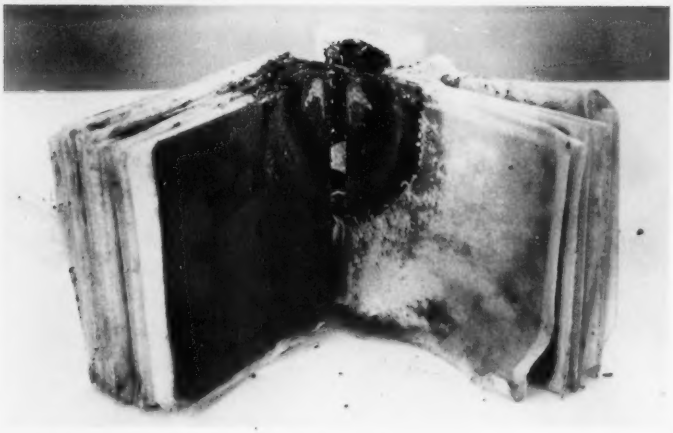
Basically, the technician will clean and inspect the housing as well as individual cells and connectors to ascertain their condition, integrity and ability to function properly. He will then restore full capacity to each cell and ensure correct electrolyte level. Should surgery be required, he will replace any defective cells or connectors (another plus for the nicad). Finally, when he has finished his job, he will hand us the battery and tell us it is ready for installation. That's it. His word is our guarantee—our only guarantee—that the battery is a healthy one ready for service. And we can't argue with him. Is it any wonder, then, that the first and most important phase of a battery's life begins at the shop?

Well, we might ask, what is so complicated about looking at a battery, dusting it off, putting a charge on it and maybe adding a little water to the cells? Those of us lucky enough to own boats but not quite lucky enough to enjoy generators on our motors do this all the time, and we don't have any battery problems. Well, it just isn't quite that simple. Let's take a closer look at what goes on in the battery shop.

As mentioned, the initial steps include a thorough cleaning and inspection of the housing, cover, individual cells and all connectors. Any item deemed unserviceable is replaced. All torquing of connectors must be done by the book. Next, the capacity of the battery is restored in strict accordance with specified procedures. Since the state of charge of each cell cannot be determined beforehand, an electrical load is placed on the battery until all cells are completely discharged. This action ensures that every cell will be restored to its maximum capacity when charged and that none will be at a higher (or lower) state of charge than others. To know when full capacity of the battery has been restored, the charging input is monitored in current and time until the ampere hour capacity has been reached. This procedure balances the cells and brings the battery to full capacity.

But wait a minute! Didn't we forget something? What about the electrolyte level? Did we charge the battery without first ensuring the electrolyte was at the correct level? We sure did—and that is the *only* way it is to be done on the nicad. As a matter of fact, we won't adjust the electrolyte level until after the battery has had time to rest and cool off. The plates in the nicad are porous and extremely absorbent. As the cells discharge, electrolyte is absorbed into the plates and the level decreases. Charging of the battery has the opposite effect, driving the electrolyte out of the plates back into the cells. If water is added when the battery is not fully charged, the cells may be overfilled. During the charging cycle, excess electrolyte may spew out the vents. Potassium hydroxide (KOH) electrolyte used in the nicad battery has a high affinity

THE POSITIVE SIDE



Arcing in damaged cell destroyed plates and. . .

burnt hole through cell housing

for carbon dioxide present in the air and will combine with it to form potassium carbonate which can clog the vents. Should this happen to a battery installed on an aircraft in flight, the result could be ruptured cells and fire or explosion. Even if vents are not clogged, formation of potassium carbonate within a cell will derate both battery capacity and performance.

How closely we follow correct procedures in the battery shop will determine to a great extent the useful life of the battery and whether or not it is going to give us trouble-free service. The importance of by-the-book maintenance cannot be overemphasized. For example, while we can easily replace an individual cell, we must be careful to ensure the new cell is the same type, has the same rating and was manufactured by the same vendor as the defective one, and if possible, it should have the same general date as that of the original battery. That is how critical maintenance of the nicad is.

Further we must stay constantly on guard to prevent contamination of the battery. Since the KOH electrolyte of the nicad is a strong alkali, it becomes obvious that no tools or equipment used to service or test lead-acid batteries should ever be used on nicads. This is an extremely critical point as the KOH electrolyte contaminates easily whether in battery cells or containers unless it is kept covered at all times. Even the fumes emitted by lead-acid batteries into the atmosphere can contaminate the nicad. For these reasons a separate battery shop for each of the two types of batteries is preferred, and separate rooms are recommended.

Supervision must constantly be exercised to ensure shop personnel are properly trained and knowledgeable in all areas relating to the servicing and maintenance of nicad batteries. But proper maintenance is not the only service the shop can provide. By keeping individual records on each battery, potential problem areas can often be predicted and preventive measures taken before failures can occur. If, for example, after battery capacity has been restored, we find we must consistently add more water to a particular cell than we do to the others, we can suspect that the single cell is operating at a higher temperature than the rest. On the other hand, if we find we must add approximately equal amounts of water to each cell but the amount is much greater than what we should normally expect to have to add (based on previous servicing requirements), then we may very well suspect that the voltage regulator is set too high. An efficiently operated battery shop is an absolute necessity for both longevity and reliability of nicad batteries.

But what about the mechanic? What part does he play in the life of a nicad? Basically, his duties consist of installing the battery and securing it, making sure the vents are clean and unobstructed. But most important is his responsibility to ensure the voltage regulator is precisely adjusted and the electrical system is operating properly. Failure to do his job in this area can negate the best efforts of the battery shop. If the voltage regulator is set too high, battery overheating and loss of electrolyte may occur as well as thermal runaway that can lead to battery failure and aircraft damage.

Finally, assuming battery shop and maintenance personnel have done their jobs properly, we come to the third determining element in the life of a nicad—the pilot. The fate of the battery now rests in his hands. He can be considerate to its temperament and reap the benefits and advantages designed into it or he can, by his actions, obliterate all previous efforts

to give him an efficient and dependable power pack. If he chooses to subject the battery to frequent, unnecessary loads, such as repeated or prolonged ground starts and checking of electrical components when external power sources are authorized and available, then he is placing the battery on the road to destruction. Heat generated by battery drain is reinforced by heat generated during the charging cycle. Results can vary from battery overheating and spewing of electrolyte to clogged vents, thermal runaway and even to the rupture of cells and explosion.

If necessity dictates that he use the battery for these purposes, he should follow certain precautions. Performing a touch test before each start (if possible) is one. This is done by touching the battery in a manner similar to that used by a housewife to check the temperature of her iron. If the battery case is too hot to hold a hand against, then the battery should be allowed to cool before another engine start is attempted.

In addition, the pilot should monitor the loadmeter periodically during flight. Should it begin reading 10 to 20 percent or more above the normal stabilized indication, he should suspect a battery problem. He should then turn off the battery switch and note any change in loadmeter indication. If the indicator shows a sharp decrease in load, he should leave the switch off and have the battery checked on landing.

Admittedly, the nicad has its own peculiar temperament. It is, in fact, almost a paradox. While it provides us with advantages not found in the lead-acid variety, it also presents us with peculiarities we are not accustomed to. But as practically every newlywed has learned, once each partner becomes aware of and understands the other's temperament, each can make adjustments that not only assure the continuation of their marriage, but also make it a happy one.

However, one bit of a problem exists with this analogy. The nicad is a rather stubborn partner that won't budge an inch. It will not arbitrate, leaving it up to us to make any adjustments needed for a happy life together. Yet, the demands it makes upon us are reasonable, simple and worth the effort:

- Thorough, supervised, by-the-book inspections and maintenance both in the shop and aboard the aircraft.
- A properly functioning aircraft electrical system, with the voltage regulator accurately adjusted.
- Proper treatment by ground and flight crews.

Only when we ensure all these procedures are followed can we be justified in our complaints when failures occur. In such instances, not only are EIRs in order, but they become meaningful since we are assured the failures did not arise from any negligence on our part.

Meanwhile, research on the nicad continues. Improvements are sure to come. Currently, for example, some manufacturers are considering increasing the number of cells. In addition, a nicad battery monitor is being tested for use aboard Army aircraft. This unit will monitor the battery case temperature and warn the pilot of the possibility of thermal runaway. While this device will not necessarily prevent battery damage, it will preclude aircraft damage from fire or explosion and enhance the occupants' safety.

Finally, let's remember that despite any undesirable or negative features the nicad may embody, it presents some powerful arguments to justify its existence. These include a constant voltage output over more than 90 percent of its total discharge time, steady voltage output under load at temperatures as low as minus 40 degrees F., no freezing of the electrolyte and no battery damage at temperatures as low as minus 65 degrees F. or lower, long life with numerous usage cycles plus the capability of individual cell replacement.

Let's look at this positive side, heed what the battery is trying to tell us, maintain it properly, treat it right, and enjoy the benefits it is trying to give us—and do it with safety.

MORE ON THE NICAD

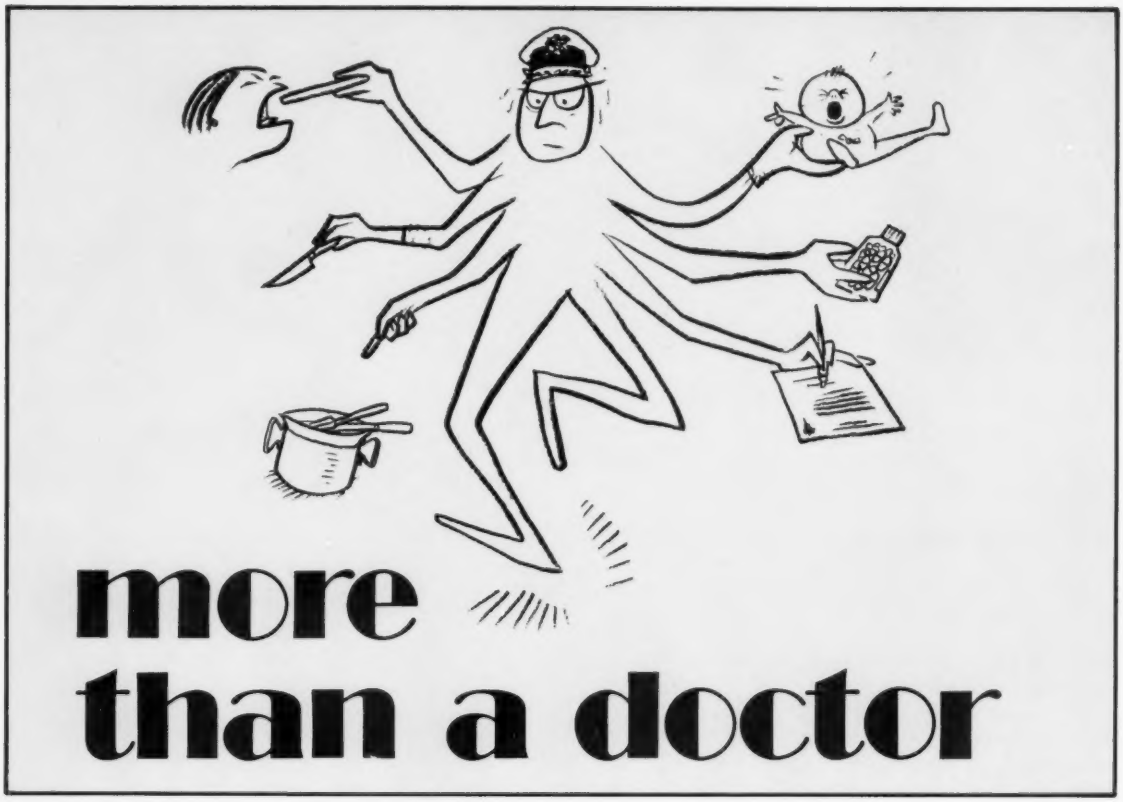
1. While you should make all battery checks and inspections in accordance with appropriate battery maintenance technical manuals 11-6140-203-15 series, be sure to check maintenance advisory message (GEN 75-7), subject: Maintenance of Aircraft Nicad Batteries, dated 13 Mar 75, USAAVSCOM, St. Louis, Missouri, for authorized procedures not yet incorporated in TMs.

2. When using the national stock number (NSN 6180-00-842-0433) to order battery cells, you may receive cells made by different manufacturers. Should this occur, make certain you do not mix them during installation in the battery case. Even though the cells shown carry the same NSN, note the difference in stud lengths between those manufactured by Saft America Inc. (formerly Gulton) and those made by General Electric.

3. Items presently being evaluated (or recently incorporated into the supply system) include the following:

- Analyzer, battery charger AN/ASM-490.
- A solid state transistorized voltage regulator.
- A 20-cell nicad battery.
- An on-board battery conditioner/analyzer.
- Multimeter AN/VSM-303A (NSN 6625-00-168-0585).

Specially trained flight surgeons have the never-ending job of making aviation safer for all concerned. . .



more than a doctor

AIRCREWMEMBERS AND THEIR dependents usually think of the flight surgeon as someone to turn to for medical care. But the flight surgeon's job is far more complex and demanding than this. Clinical care is only one of many functions required of the flight surgeon. To appreciate the demands on the flight surgeon, let's look at some of his functions involving aircraft accident prevention and investigation.

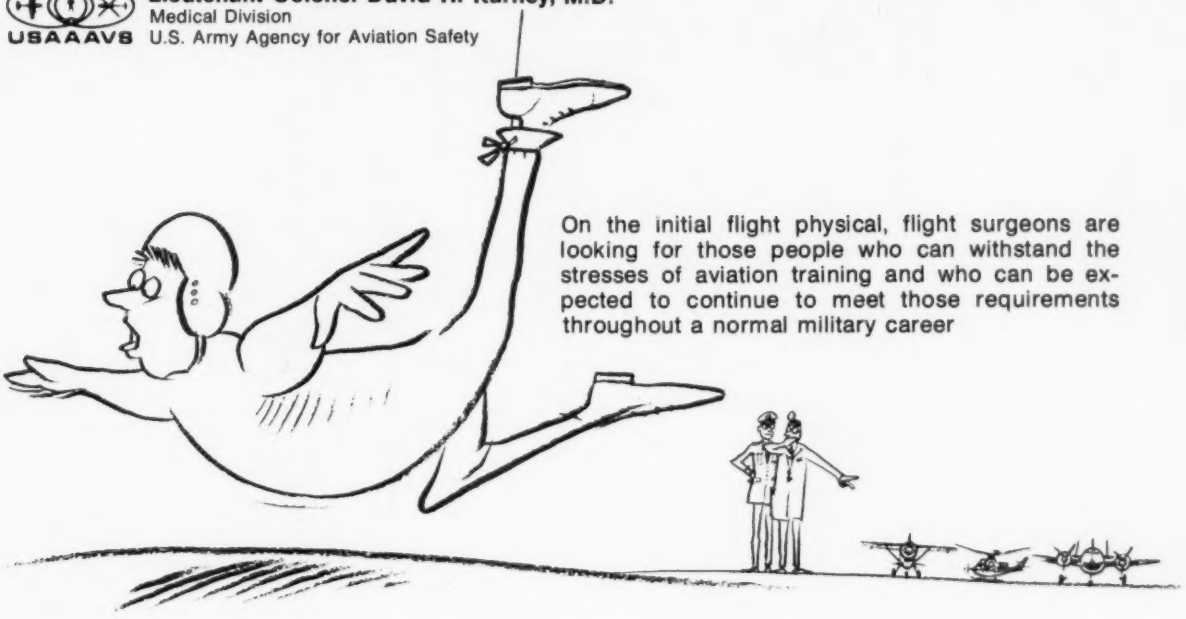
Most aviation personnel see a flight surgeon for the first time when they have their initial flight physical. At this time, the physical standards for initial entry into the aviation program (outlined in AR 40-501 as Class I or IA flying standards) are adhered to. These standards address aviation safety and the Army's need for acquiring individuals who can withstand the stresses of the aviation training environment and who can be expected to continue to meet those requirements throughout a normal military career. For example, minor visual problems that do not present a particular safety problem upon initial entry into aviation, but which can be predicted, with reasonable certainty, to progressively worsen must be considered.

Following entry into the aviation program, a new set of physical standards (Class II) applies. Flight surgeons use these standards during periodic physical examinations to determine if a person is physically fit to continue flying. The standards that apply in these examinations are strictly to determine whether or not a person is physically and psychologically capable of coping with the Army aviation environment.

Flight surgeons also use physical standards and periodic examinations when serving on flying evaluation boards. They are responsible for determining if individuals being reviewed for retention in the aviation program are physically and psychologically qualified for continued flying duty.

A second function of flight surgeons is to provide clinical care to

Lieutenant Colonel David H. Karney, M.D.
Medical Division
USAAAVS U.S. Army Agency for Aviation Safety



On the initial flight physical, flight surgeons are looking for those people who can withstand the stresses of aviation training and who can be expected to continue to meet those requirements throughout a normal military career

the aviation population including, when possible, dependents. Here the goal is early detection and treatment of unsafe physical and psychological conditions. Personnel are restricted from flying when it is felt that existing conditions compromise flight safety. Early treatment of these conditions usually produces a quick return to full flying duty. In this way, flight surgeons accomplish the Army Medical Department's mission of "conserving the fighting strength." Also, through the clinical, doctor-patient relationship and preventive medicine techniques, they help maintain aviation personnel in optimum physical condition not only to fly but to do so safely. This is accomplished by encouraging individuals to limit self-imposed stresses, to practice good nutritional habits and to maintain a sound physical conditioning program. Through other preventive medicine measures such as the immunization program, the incidence of various diseases is reduced; and through such programs as hearing conservation, occupational injuries are minimized.

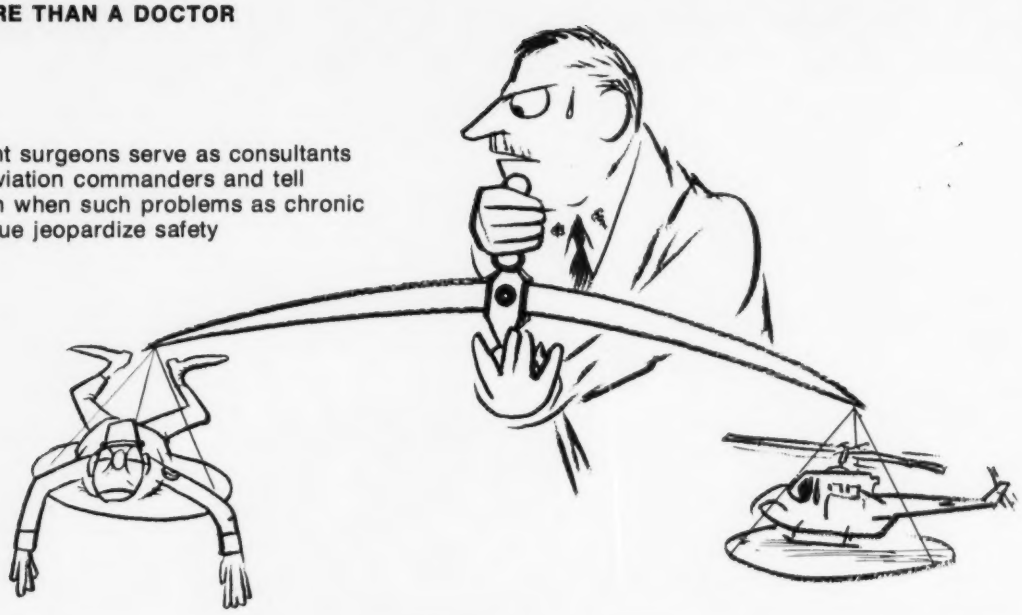
A third function of flight surgeons is serving as consultants to aviation commanders on individual and unit health problems that might compromise flying safety. It is their responsibility to tell commanders when an aviator is unsafe to fly. It is also their responsibility to be aware of the overall health and morale of aviation units and to tell commanders when such problems as chronic fatigue jeopardize safety.

In addition, flight surgeons serve as consultants to commanders on the physiological and psychological stresses of aviation missions. The unique missions of Army aviation, such as night NOE flying, present problems which are not ordinarily encountered on routine administrative or training flights.

A fourth function of flight surgeons is to actively participate in unit aviation safety programs through educational presentations on such subjects as disorientation, stress, physical fitness, and the effects of illnesses and drugs on flying safety. They develop organized educational programs for their units on normal day-to-day problems and their effect on aviation safety.

A final function is the participation in aircraft accident investigations. A review of specific tasks flight surgeons must accomplish in investigations deserves special consideration. Too often the importance of their full participation in investigations is overlooked because many assume that if there are no injuries or fatalities in an accident, no flight surgeon is required for the investigation. Chapter 11, AR 95-5, requires a flight surgeon on each aircraft accident investigation board to conduct a human factors investigation. This is a vital role because human error is involved in the vast majority of our accidents. Also, data obtained from analysis of causes of injuries, fatalities and emergency egress difficulties provide a basis for improved crashworthiness and systems safety. Documentation of survival and rescue problems en-

MORE THAN A DOCTOR



Flight surgeons serve as consultants to aviation commanders and tell them when such problems as chronic fatigue jeopardize safety

countered after an accident assists in formulating requirements for survival equipment.

Like all accident investigation board members, the flight surgeon's work begins long before an accident occurs by developing an effective preaccident plan. Procedures for immediate notification and deployment of an accident board to the accident site should include the flight surgeon. Medical treatment and investigation kits must be preassembled and made readily available. Prior coordination with local medical facilities, pathologists, radiologists and coroners is required. Flight surgeons must be knowledgeable in the different types of aircraft and operations conducted and be prepared to respond quickly when an accident occurs.

At the accident site, the flight surgeon's first concern is to treat and evacuate any survivors, although this has usually already been done. Obvious fatalities are handled in much the same manner as a medico-legal team would conduct an investigation of an unexplained death. Bodies are moved only after all information needed is documented with photographs, diagrams and notes. This information can be used later for identification, for determining who was at the controls at the time of the accident, and in pinpointing causes of injuries and death. Special attention is given to seats, controls, cockpit components, restraint systems, protective and survival equipment, and personal effects. Witnesses have to be interviewed, bodies evacuated for autopsy examination and wreckage components secured for later detailed examination.

When the crash site investigation has been completed, autopsies are done; commanders, relatives, friends and other individuals are interviewed for additional background information; and appropriate records, e.g., health, personnel and individual flight, are

Flight surgeons provide clinical care to the aviation population including, when possible, dependents

reviewed. Assistance may be requested from the Aerospace Pathology Division, Armed Forces Institute of Pathology (AFIP), and the Medical Division, U. S. Army Agency for Aviation Safety (USAAAVS). All of these activities are coordinated with those of the other investigation board members. Ideally, flight surgeons participate in all board deliberations to analyze the accumulated information and formulate the final accident report.

Although the flight surgeon is not solely responsible for the entire human factors investigation, his broad background in this area usually makes him the best suited board member to coordinate it and ensure that all factors are considered and documented. Human factors encompass at least six areas—human error, human engineering, command or "command environment," crash survival, emergency egress, and rescue and survival. Chapter 11, AR 95-5, Aircraft Accident Prevention, Investigation, and Reporting, describes in detail the requirement of the human factors investigation.

It is the flight surgeon's responsibility to determine the tasks individuals were expected to perform, what errors were made in performing those tasks that may have contributed to the cause of the accident, what inadequacies in the aviation system allowed the errors to be made and what remedial measures can be taken to prevent the same errors from being repeated. Human engineering addresses the man-machine interface for design inadequacies in aircraft systems and is evaluated to determine if it was a contributing factor. "Command environment" represents the working climate of individuals that could have had an adverse effect on personnel performance.

A crash survival investigation is conducted to determine if the accident was survivable and, if so, how injuries and fatalities were caused and how they could have been prevented. Emergency egress investigation attempts to identify difficulties encountered in exiting the aircraft after the accident, while the rescue and survival investigation pinpoints problems arising from the time individuals exit the wreckage until they are rescued.

This overview of some of the flight surgeons' duties—from the care of individual aviators to the investigation and prevention of aircraft accidents—shows how they contribute their knowledge of the aircrewman's capabilities, limitations and needs to flight safety. However, to fully understand the workings of aviation medicine, two things must be kept in mind. First, flight surgeons are always available to take care of all phases of aviation medicine so that flying can be made a safer proposition, and second the treatment they prescribe or course of action they recommend is, in their judgment, in the best interest of all concerned—the Army, the aircrewman and the aircrewman's family.

The Army's Aviation Medicine Program is outlined in Section 3, AR 40-5, dated 25 Sep 1974, and describes the flight surgeon's role in the Army's Aviation Safety Program. The objectives of this program are:

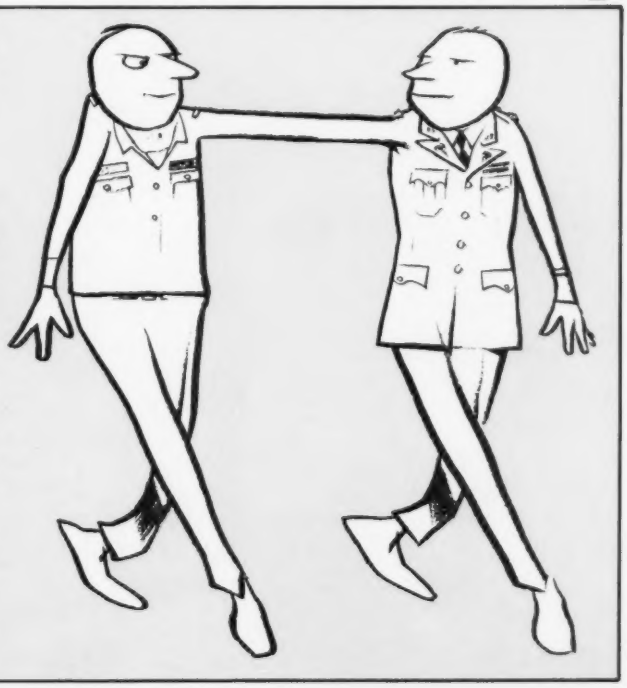
"The Army Aviation Medicine Program is multi-disciplined to promote aviation safety and prevent illness and injury of Army aviators and aviation support personnel. General preventive medicine, environmental medicine and occupational health are closely allied as related to the special environment of aviation operations."

Specific aims of the program are to:

"a. Promote the health and safety of aviation personnel through appropriate preventive medicine practices.

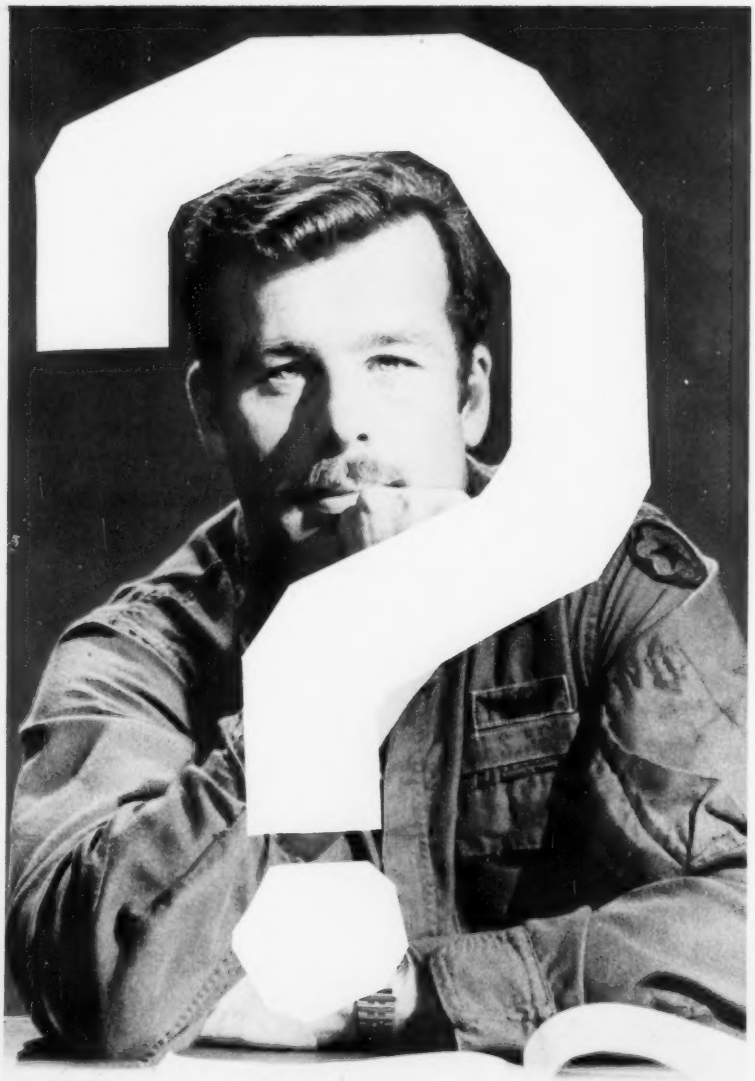
"b. Assure a safe, toxic-free environment for aviation personnel.

"c. Evaluate personal equipment and man-machine interface for toxic and hazardous conditions prevention."



Sometimes less than spectacular mishaps reveal spectacular shortcomings

YOUR UNIT?



A YOUNG BRIDE looking at the diamond on her hand sees only perfection and beauty. It takes a trained professional jeweler to detect any flaws in a perfect-appearing diamond.

An aviation unit with a multi-thousand-hour accident-free flying record may also appear to be perfect. But it takes only one accident to bring that unit under the close scrutiny of several professionals of an accident investigation board.

However, unlike the bride who has no training in gemology, an aviation unit is made up of trained professionals, capable of detecting and correcting flaws themselves. Unfortunately, sometimes the imperfections remain hidden until it is too late.

This recent helicopter accident happened during a tactical training exercise. There was nothing spectacular about the mishap and the crew escaped without injury. But the investigation that followed uncovered many flaws within the unit.

The accident. While the pilot was talking on the radio, looking to his left over the crew chief, checking the ridge and his rotor blades, and watching a flight of aircraft all at the same time, he allowed the tail stinger to strike the ground. Then the tail rotor blades broke off, causing a loss of control. Unusual attitudes followed and the main rotor and tail boom struck the ground. The helicopter rolled over and came to rest on its side.

A thorough job by the accident investigation board produced the following information:

Personnel. The pilot had almost 2,000 flight hours. He had more than 700 combat hours and more than 125 hours as IP in this type aircraft. He had attended a

Arnold R. Lambert
Publications and Graphics Division
USAAAVS U.S. Army Agency for Aviation Safety

nap-of-the-earth course and had recently received a proficiency checkride. He was a conscientious and dedicated officer who became deeply involved in the training exercise. Just before the accident, he said he was "hopped up" over the excitement of the tactical situation and aggressor movements. Investigation showed he had a strong desire not only to succeed but to excel among members of the unit. This strong desire may have contributed to his immediate supervisor's failure to notice or fully appreciate the number of hours the pilot had been awake, and the hours he had flown under stressful conditions before the accident. The 4½ hours just before the accident were flown nap-of-the-earth under stressful simulated combat situations.

Aircraft airworthiness. There were no aircraft discrepancies found which contributed directly to the accident. But the investigation board did note the casual attitude toward maintenance, lack of crew discipline, and improper maintenance records found throughout the unit. The aircraft was flown to the field the preceding day, then returned to the airfield maintenance area. Before a dash 12 could be filled out, the unit maintenance officer insisted on having the aircraft as a replacement for his troop. (A dash 12 was filled out following the accident.) The maintenance officer flew the aircraft to the field site, landed, then flew with the pilot to check out the cyclic pressure he felt was uncomfortable. These two flights were not logged. The force gradient was removed from the aircraft but this action was not entered on the dash 13.

The dash 13 carried the daily status symbol as a red X. The red X condition had been corrected and initialed, but the status symbol had not been changed. The pilot said he saw this, flipped the dash 13 over and saw the condition had been corrected, so he flew the aircraft.

Records. The dash 13s showed time flown, but there were no flights logged and signed off by the pilot. This was true at squadron level as well as troop level. The dash 14 showed the inverter as being inoperative for more than 4 months—more than enough time for correction of this fault. A work order number had been given, but a search at the unit and at direct support maintenance failed to turn up the work order. This inoperative inverter resulted in a faulty attitude indicator. The pilot involved in the accident made control inputs based on attitude indicator readings.

The adequacy of the preflight was definitely questionable. Although not directly contributing to the accident, it showed a general lazy attitude toward maintenance and records keeping. Weight and balance was found to be acceptable, but the materials carried (propane gas bottles) were dangerous.

Command. The crew chief had his tools in an ammunition can which opened during the crash sequence. The tools scattered, presenting additional hazards to the crew. The use of ammo cans as toolboxes was found to be a common practice.

The pilot had two helmets because his commander wanted complete tactical surprise during training. One helmet was striped with dayglow tape. The pilot said his commander did not like the tape, so he had a second helmet which was all OD. Tape is used to mark helmets because it can be easily removed for deployment into a combat situation. Serious consideration should be given by commanders as to whether the small training advantage achieved by removal of safety reflective tape outweighs the requirement for crew safety during peacetime training. Issuing the pilot two helmets shows poor supply economy within the unit.

Transporting hazardous materials aboard aircraft nullifies the research and expense of installing crashworthy fuel systems. Not only were the gas bottles fire hazards, but they could have become lethal missiles in the cockpit/cabin areas during a crash.

The unit SOP called for wearing the survival vest. The pilot's vest was found in the cabin of the aircraft, so it was not available when he exited the aircraft following the accident.

This unit also had an SOP for flying hours and crew rest. The pilot had been on duty for nearly 40 hours without sleep and had flown more than 16 hours during the previous 24 hours. This contributed to the accident. The board felt this was not an isolated case. The fact that there was guidance in these areas in the SOP appears to be irrelevant since it obviously was not being adhered to nor enforced.

There are indications that the rationale for deleting the aircraft safety portion from the unit's tactical SOP was that it was too bulky and too detailed. Safety measures were ignored in favor of realistic tactical training.

Could this be your unit?

PEARL'S

Personal Equipment & Rescue/Survival Lowdown

If you have a question about personal equipment or rescue/survival gear, write Pearl, USAAAVS, Ft. Rucker, AL 36362

Pants In or Out?

Request clarification on the proper way to wear the two-piece Nomex flight suit while flying. Should the trouser legs be tucked into the top of the boot and are blousing rubbers permitted? Or should the trouser legs be worn on the outside of the boot and fastened with the sure-grips as designed? Which of the two ways gives the maximum fire protection and which way does USAAAVS recommend?

There is no formally prescribed Department of the Army policy on the wear of fire-retardant protective flight clothing. USAAAVS' position is that the pants leg is worn over the upper half of the boot shank.

The trouser leg was designed to be worn over the boot shank as witnessed by the rather bulky velcro tabs or drawstrings and the abundance of material. The abundance of material is present for a reason. A loose fit helps protect the individual by creating a highly insulative dead air space between the wearer's skin and the hazardous environment. Placing the trouser leg inside the top of the boot precludes supporting the dead air space and has resulted in severe burns to the calf of the leg. Blousing the trousers on the leg above the boot shank (as with blousing garters) causes a band of the leg to be exposed and an undesirable tourniquet effect. Both of these hazards must be avoided.

Velcro for Flight Uniforms

I need the stock numbers for the velcro fasteners and hooks found on the cuffs of shirts and trousers of the two-piece Nomex flight uniforms. I also need to know where they can be ordered.

Chapter 7 of TM 10-8400-201-23, with changes, tells all about repairing Nomex and gives the stock numbers for the velcro fasteners and hooks. As the unit of issue for this material is by the yard, you may be able to get replacement fasteners from "DXed" stock. The hooks and fasteners can be ordered through your supply activity.

One-Piece Flight Uniform

While I was at Fort Rucker last year I talked to a Medical Corps captain who was testing a new type of flight uniform. From our conversation I learned that this one-piece suit would be replacing the two-piece Nomex and also would be adopted by all the services for aviation use.

Would you confirm or deny this information and, if it is true, give me a projection date of when the uniform might get into the supply system, including NSNs.

What you saw was a test uniform that was not adopted. The Army only procures the two-piece uniform, and we expect it to be around for quite a while. Stocks of Nomex material are sufficient to last several years at present use levels.

A tri-service one-piece Nomex for the future looks real good, but don't plan on it until we exhaust the present uniforms and material.

Vest Type Survival Kit

Vest type survival kit with components, NSN 8465-00-177-4819, may be received less the lensatic compass, NSN 6605-00-151-5337, or the approved substitute compass, NSN 6605-00-515-5637, due to current nonavailability of the item(s).

Appropriate billing adjustment (currently $18.76) will be made to credit the requisitions for shortage of the compass.

Follow-on information will be furnished through FLIGHTFAX and the next scheduled U.S. Army Support Activity "Supply Information Letter," advising when and how to obtain the compass when it becomes available for issue.

Contact points:

- Commander, USAAVSCOM, ATTN: DARCOM-POLSE (Mr. A. B. C. Davis), P. O. Box 209, St. Louis, MO 63166, AUTOVON 698-3241/3291.
- Commander, USAAAVS, ATTN: IGAR-TA, Ft. Rucker, AL 36362, AUTOVON 558-4806/2091.

USA AAV8

CW4 Nicol received his warrant in 1965. He served three tours in Vietnam and has 3,700 hours of flight time in both fixed- and rotary-wing aircraft. He is assigned to HHC, 2d Brigade, as the aviation safety officer in the brigade aviation section. CW4 Nicol received the Broken Wing Award for his professional skill, judgment and technique during this ditching mishap.

Lessons can be learned from this story, as told by the pilot, about. . .

DITCHING THE HUEY

CW4 John L. Nicol

WE WERE ON AN IFR training mission and the copilot was on the controls of the UH-1H. During climbout away from the shoreline and at approximately 2,500 feet, the engine chip detector light came on. I told the copilot to start a left turn back to the airfield and I let departure control know about our emergency. While I was getting clearance to the airfield, the low oil pressure light came on and seconds later the engine failed. We had discussed before the flight what we would do in an emergency. I took control of the aircraft, made a Mayday call and started an autorotation to the shore.

At the time of the emergency I was in the right seat and the copilot was in the left. The IP was in the left troop seat and a passenger, who was acting as safety observer, was in the jump seat. During descent, we tried to jettison the cockpit doors. The right door was jammed and wouldn't release. The IP opened the left cargo door, but the right door was blocked by cargo. He stood the Mark VII liferaft on end near the open cargo door.

At the bottom of the autorotation, I forgot about the door which wouldn't jettison and tried a zero ground-run autorotation, but still had forward movement with a 15- to 20-knot tailwind. After turning downwind toward the shore and perpendicular to the

DITCHING THE HUEY

waves, I made a standard flare to zero the airspeed and groundspeed, leveled the helicopter, applied initial pitch pull and gradually increased collective. It seemed as though the aircraft fell through the last 4 or 5 feet and, as it hit the water, my door dislodged and went out in front of the aircraft. I didn't feel any particular force on my seatbelt and don't believe the aircraft hit hard enough to break the chin bubble. I remained in the seat for a fraction of a second waiting for the aircraft to settle. When it started rolling to the left, I applied forward left cyclic. I then unfastened my seatbelt, climbed up on the right door and watched the main rotor blade stop. Then I dove into the water.

When I surfaced, the tail boom was sticking up at about a 45-degree angle and the fuselage was completely under water. The aircraft was upside down because I could see part of the skids. The aircraft was completely submerged about 30 to 45 seconds after impact.

The IP and safety observer also exited through the right front door. The copilot went out through the left cockpit door and inflated the liferaft which was tossed out when the aircraft hit the water. All of us had on the LPU-10/P waterwings and once we were in the raft, we checked each other for injuries. Only the copilot had been injured and then only slightly. He received a back abrasion while getting out of the aircraft.

We contacted the tower using our URC-10A radio and then started paddling for shore. Reaching the first large breakers, we tried to align the raft to prevent being capsized by the 10- to 20-foot waves, but the raft flipped end-over-end. The copilot and I made it back to the raft. The other two crewmembers dogpaddled to within 200 yards of the shore. They were then in shallow water and were able to walk the rest of the way. About this time, some people on shore came out on surfboards and helped pull the raft in.

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USAAAVS personnel interviewed the crewmembers involved in this ditching and several points worthy of note were brought out.

Failure to open the right cargo door temporarily hindered the egress of the IP, who was in the left troop seat. As the aircraft rolled on its left side, he was hit by the cargo which was not restrained. This situation could result in serious injuries or even fatalities so it is important that all cargo be tied down. Ditching procedures in chapter 4, TM 55-1520-210-10, require that both cargo doors be opened before ditching. In addition, USAAAVS suggests that if time permits cargo doors be "locked" open to prevent possible closing or jamming upon impact. However, the IP felt that during autorotation from low altitude, he might become a flying missile if not restrained in his seat when the aircraft hit the water. This was another reason he decided not to open the right cargo door.

Another point of discussion concerned when the pilot's and copilot's doors should be jettisoned, considering the possibility of the door hitting the tail rotor or perhaps the 90-degree gearbox. Emergency procedures state that these doors should be jettisoned at low altitude. Conversely, one crewmember felt that, if autorotating from 1,500 feet or below, there may not be time for the aviators to jettison their doors until touchdown. Another crewmember suggested that when jettisoning the right door, kick right pedal and when jettisoning the left door, kick left pedal if altitude allows enough time. At this writing, USAAAVS research on this point is not thorough enough to develop a position.

When flying over water, crews should wear all required survival gear. While all crewmembers were wearing waterwings, only two of them were wearing the SRU-21/P survival vest. The vests were in the aircraft and unit SOP stated they would be worn. Although this did not present any serious consequences, it could have had the crewmembers been further out to sea and become separated from each other.

The pilot had his waterwings on over the SRU-21/P rather than under the vest (TM 55-8465-215-10). He had difficulty getting into the raft and tried to push the wings rearward, but couldn't. He had to detach the chest strap on the wings to get into the raft. He failed to refasten the strap and when the raft capsized he momentarily lost his waterwings. If the wings had been worn properly, the vest would have provided better retainability for the wings.

The crew also felt that a preflight briefing concerning each individual's responsibility, which door to use for egress, and the proper use and wear of survival equipment improves chances of survivability. They had recently received egress training which prepared them well for this.

Overwater flights in Army aircraft are now routine and the need for water survival training and practice is apparent. Because of limited formal training, each unit must have and support a vigorous water survival training program. This training should be geared to individual unit operating conditions. Survival knowledge, know-how and training instill confidence and develop proficiency.

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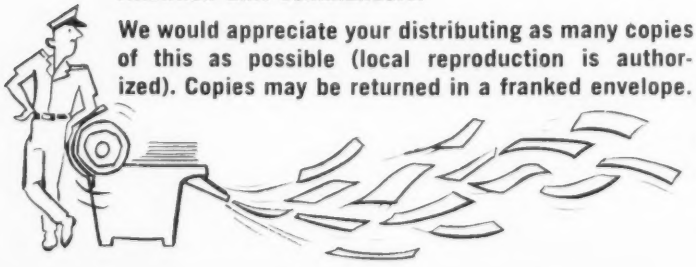

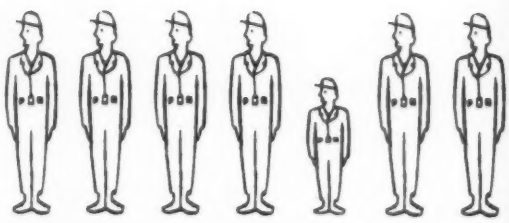

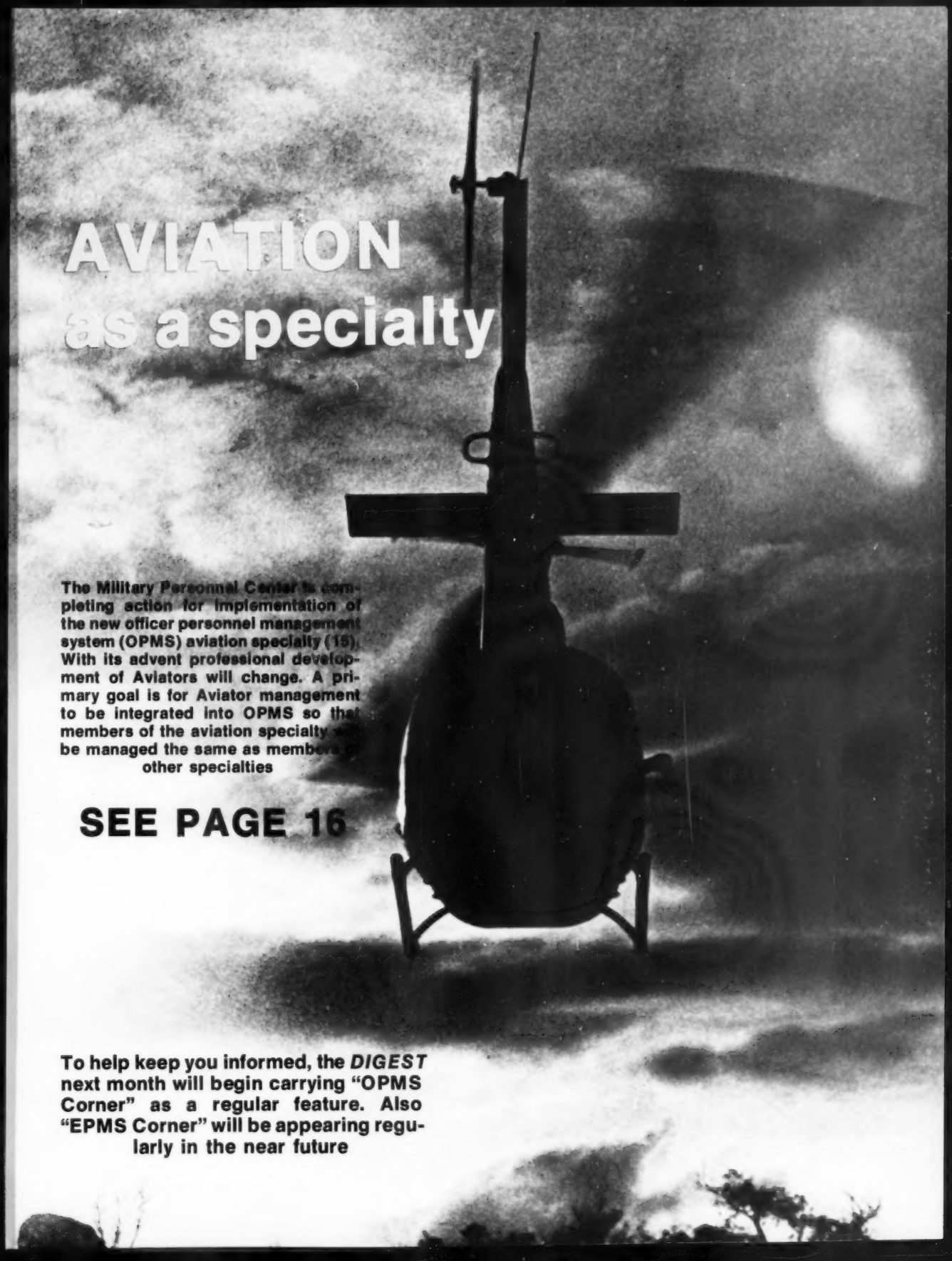

AVIATION as a specialty

The Military Personnel Center is completing action for implementation of the new officer personnel management system (OPMS) aviation specialty (15). With its advent professional development of Aviators will change. A primary goal is for Aviator management to be integrated into OPMS so that members of the aviation specialty will be managed the same as members of other specialties

SEE PAGE 16

To help keep you informed, the *DIGEST* next month will begin carrying "OPMS Corner" as a regular feature. Also "EPMS Corner" will be appearing regularly in the near future

REMEMBER THE FIVE "Cs"

- CONTROL - Keep aircraft straight and level.
- COORDINATION - Pilot concentrates on instruments; copilot looks outside.
- CLEARANCE - Clear highest obstacles with straight controlled climb.
- COURSE - Select and turn to appropriate heading.
- CALL - Make required radio call for assistance.

USAAAVS